EPA 530-R-97-019

Waste Minimization Prioritization Tool

Beta Test Version 1.0

User's Guide and System Documentation

Draft

Office of Solid Waste
and
Office of Pollution Prevention and Toxics
U.S. Environmental Protection Agency
Washington, DC 20460

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Please Read This Before Installing the WMPT!

What Do I Need to Run the *Waste Minimization Prioritization Tool*?

The WMPT contains a large database, and accessing this database requires considerable computer resources. The minimum personal computer configuration requirements to run the software are: ❶ 16 megabytes of RAM; ❷ a 486-33 or Pentium® processor; ❸ 15 megabytes of free disk space; ❹ a 1.44 floppy disk drive; and ❺ a Windows-compatible mouse (recommended but not required).

How do I Install the WMPT and Get Started?

The software can be installed in Windows® 3.x, Windows® 95, or Windows® NT 3.5 or 4.0. In Windows® 3.1: ❶ Insert disk 1 in floppy drive. ❷ Select the "File" menu. ❸ Click on "Run" ❹ At the "Command Line" prompt, type in "a:\setup.exe" From there, follow the directions on the screen. (These steps will vary for the other versions of Windows®.)

Once the software is installed: ❶ Click on the "WMPT" icon. ❷ Select "File" ❸ Click on "Open" ❹ Select "Chemical.MDB"...and you are ready to begin. See the WMPT ReadMe file for more information on getting started.

Details on how to install and operate the software are included in Chapter 2 of the *Waste Minimization Prioritization Tool (Beta Test Version 1.0): User's Guide and System Documentation (Draft)*, June 1997. You can obtain an electronic version of the *User's Guide* (in Adobe Acrobat® format) on the Internet by accessing: http://www.epa.gov/epaoswer. At the OSWER homepage, select "Hazardous Waste," then "Waste Minimization." You can also obtain a hardcopy or electronic version of the *User's Guide* by contacting the RCRA Hotline at 1-800-424-9346 and providing the document number (EPA530-R-97-019). (Please note that given the large size of some of the electronic files, it may take significant time to download, read, and print them.)

What If I Have Technical Difficulties or Questions on How to Apply the WMPT?

If you are having difficulties loading or running the software, or if you would like to know more about potential applications of this tool and related products to identify source reduction and recycling priorities, you can:

❶ View some of the frequently asked questions concerning the WMPT. Go to the same EPA waste minimization Internet site listed above. Click on *WMPT Ask Me* and then click on *WMPT FAQ*.

❷ Send an E-mail message to wmpthelp@icfkaiser.com. If you do not have access to E-mail, send a fax to "WMPT Help" at (703)934-9740. Please provide the following information, as appropriate, in your message: your name, organization, E-mail address, phone number, fax number, and a detailed description of your questions. Please do not submit any confidential business information (CBI) as part of your inquiry. We appreciate your interest in applying the WMPT and will try to respond to your inquiry, by phone or through a return E-mail or fax message, as quickly as possible. However, depending on the number and nature of the inquiries received, it may take us one or more working days to respond to them. This technical support will be available during the public comment period on the WMPT (i.e., through early August 1997) and may be extended depending on need.

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What If I Have Comments on the WMPT?

If you would like to provide comments on the WMPT, the *User's Guide*, or related products, you can:

❶ Submit comments electronically by sending electronic mail through the Internet to: rcra-docket@epamail.epa.gov. All electronic comments must be submitted as an ASCII file avoiding the use of special characters and any form of encryption. Or,

❷ Send an original and two copies of your comments to: RCRA Docket Information Center, Office of Solid Waste (5305G), U.S. Environmental Protection Agency Headquarters (EPA, HQ), 401 M Street, SW, Washington, DC 20460.

Comments should reference docket number F-97-MPCA-FFFFF. Please separate any comments into the following topic areas: ❶ Technical aspects of WMPT software (e.g., data, scoring algorithms, functions, and products); ❷ Presentation aspects of WMPT software (e.g., ease of use and appearance of screens); ❸ WMPT User's Guide and System Documentation (e.g., information provided and ease of use); ❹ Potential applications of WMPT (in promoting waste minimization); and ❺ Other comments.

Commenters should not submit electronically any confidential business information (CBI). Please contact the RCRA Docket at 703-603-9230 for information on the public comment period.

DISCLAIMER

This document has been subjected to U.S. Environmental Protection Agency's peer and administrative review and approved for publication. This document is intended as advisory guidance in developing approaches for pollution prevention. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

PREFACE

In November 1994, U.S. EPA released the Waste Minimization National Plan (WMNP). The WMNP focuses on reducing the generation and subsequent release to the environment of the most persistent, bioaccumulative, and toxic chemicals in hazardous wastes, and establishes three goals:

1) To reduce, as a nation, the presence of these chemicals in hazardous wastes by 25 percent by the year 2000 and by 50 percent by the year 2005.
2) To avoid transferring these chemicals across environmental media.
3) To ensure that these chemicals are reduced at their source whenever possible, or, when not possible, that they are recycled in an environmentally sound manner.

Stakeholders involved in development of the WMNP emphasized the need to prioritize source reduction and recycling activities based on risk and requested a flexible screening tool that would assist them in identifying priorities. EPA subsequently committed in the WMNP to develop a tool that would prioritize chemicals based on persistence, bioaccumulation potential, toxicity, and quantity. EPA has developed this tool, the Waste Minimization Prioritization Tool (WMPT), and is releasing a beta-test version for public review.

The WMPT is a joint product of EPA's Office of Solid Waste (OSW) and EPA's Office of Pollution Prevention and Toxics (OPPT). It provides a screening-level assessment of potential chronic (i.e., long-term) risks to human health and the environment. The relative chemical rankings derived from the software can complement other risk or cost information in the decision-making process. The system also provides users with the flexibility to modify underlying chemical data and scoring thresholds. In addition, the software includes a chemical-waste code crosswalk, which can be used to identify hazardous waste streams containing particular chemicals, as well as information on some of the regulatory and non-regulatory lists on which chemicals may appear.

This document is the user's guide to, and technical documentation for, the WMPT. The user's guide includes Chapters 1-3, which provide background information on the software, explain its functions, and present some potential applications. The technical documentation includes Appendices A-G, which explain the technical details of chemical scoring and aggregation and describe the supplementary information that the software provides.

The WMPT is a work in progress. Functions will be added or modified in future versions based on public comments. We welcome any comments you may have on the software and on this document. Call the RCRA Docket at (703) 603-9230 for information on the public comment period and how to submit your comments. The docket number for comments on the WMPT is F-97-MPCA-FFFFF.

CONTENTS

ACRONYMS AND ABBREVIATIONS

ACGIH	American Council of Governmental Industrial Hygienists
AQUIRE	Aquatic Information Retrieval Database
ATSDR	Agency for Toxic Substances and Disease Registry
AWQC	Ambient Water Quality Criteria
BAF	Bioaccumulation Factor
BCF	Bioconcentration Factor
BRS	Biennial Reporting System
CAA	Clean Air Act
CAS	Chemical Abstracts Service
CASRN	Chemical Abstracts Service Registry Number
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMA	Chemical Manufacturers Association
CMC	Criterion Maximum Concentration
CO_2	Carbon Dioxide
CORR	Chemicals on Reporting Rules
CSI	Common Sense Initiative
CWA	Clean Water Act
DDT	Dichlorodiphenyltrichloroethane
DoD	Department of Defense
DWCD	Drinking Water Criteria Document
EC_{50}	Median Effect Concentration
EHC	Environmental Hazard Communication
EPI	Estimation Program Interface
ERD	Emergency Response Division (U.S. EPA)
FAV	Final Acute Value
FCV	Final Chronic Value
FDA	Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FR	Federal Register
GAO	General Accounting Office
GI	Gastrointestinal
GLWQI	Great Lakes Water Quality Initiative
GMATC	Geometric Mean Maximum Allowable Toxicant Concentration
GPRA	Government Performance and Results Act
HEAST	Health Effects Assessment Summary Tables
HQ	Headquarters
HSWA	Hazardous and Solid Waste Amendments
HWIR	Hazardous Waste Identification Rule
IARC	International Agency for Research on Cancer
IDLH	Immediately dangerous to life and health
IRIS	Integrated Risk Information System
K_{ow}	Octanol-water partition coefficient

lbs	Pounds
LC_{50}	Median Lethal Concentration
LD_{50}	Median Lethal Dose
LDR	Land Disposal Restrictions
LOAEL	Lowest Observed Adverse Effect Level
LOEC	Lowest Observed Effect Concentration
log K_{ow}	Logarithm of the octanol-water partition coefficient
log P	Logarithm of the octanol-water partition coefficient
M	Mass or quantity of a chemical
MATC	Maximum Acceptable Toxicant Concentration
mg/kg	milligrams/kilogram
mg/L	milligrams/liter
mg/m^3	milligrams/cubic meter
NAAQS	National Ambient Air Quality Standards
NIOSH	National Institute for Occupational Safety and Health
NOAEL	No Observed Adverse Effect Level
NOEC	No Observed Effect Concentration
NRC	National Research Council
OECA	Office of Enforcement and Compliance Assurance (U.S. EPA)
OERR	Office of Emergency and Remedial Response (U.S. EPA)
OPPT	Office of Pollution Prevention and Toxics (U.S. EPA)
ORD	Office of Research and Development (U.S. EPA)
OSHA	Occupational Safety and Health Administration
OSW	Office of Solid Waste (U.S. EPA)
OW	Office of Water (U.S. EPA)
PAH	Polycyclic aromatic hydrocarbon
PBT	Persistent, bioaccumulation potential, and toxicity
PC	Personal computer
PCB	Polychlorinated biphenyl
PCL	Prioritized Chemical List
PEL	Permissible exposure limit
PPA	Pollution Prevention Act
ppm	Parts per million
q_1^*	Cancer Potency Factor
RCRA	Resource Conservation and Recovery Act
REL	Recommended exposure limit
RfC	Reference Concentration
RfD	Reference Dose
RQ	Reportable Quantity
SAB	Science Advisory Board (U.S. EPA)
SAR	Structure-activity Relationship
SARA	Superfund Amendments and Reauthorization Act of 1986
SAT	Structure-activity Team
SCV	Secondary Chronic Value
SEP	Supplemental Environmental Projects
SETAC	Society of Environmental Toxicology and Chemistry

SIC	Standard Industrial Classification
SQC	Sediment Quality Criteria
STEL	Short-term exposure limit
TLV	Threshold Limit Value
TOC	Total Organic Carbon
TPQ	Threshold Planning Quantity
TRI	Toxics Release Inventory
TSCA	Toxic Substances Control Act
TSS	Total Suspended Solids
TWA	Time-weighted average
UCLA	University of California, Los Angeles
UCSS	Use Clusters Scoring System
UN	United Nations
U.S. EPA	United States Environmental Protection Agency
WMNP	Waste Minimization National Plan
WMPT	Waste Minimization Prioritization Tool
WOE	Weight-of-evidence

CHAPTER 1
BACKGROUND ON WMPT

Prior to applying this type of decision-making tool, it is helpful to understand some of the background on the process behind its development, its underlying logic, and how it is intended to be applied. Section 1.1 of this chapter presents the origins of the Waste Minimization Prioritization Tool (WMPT). Section 1.2 describes the rationale behind its relatively simple risk screening approach. Section 1.3 provides a conceptual overview of how the system scores and ranks chemicals and describes the supplemental information it provides. Finally, section 1.4 provides important information on the context in which the tool is intended to be applied.

1.1 ORIGINS OF WMPT

This section describes the origins of the Waste Minimization Prioritization Tool (WMPT), outlining some of the statutory language promoting source reduction and recycling, describing the goals of the Waste Minimization National Plan (WMNP) and the objectives of the Government Performance and Results Act (GPRA), and summarizing the process used to select and develop the WMPT approach.

1.1.1 Federal Statutory Language Promotes Source Reduction and Recycling

The origins of the WMPT trace back to federal statutory language that promotes source reduction and recycling of the nation's wastes. The Hazardous and Solid Waste Amendments of 1984 (HSWA), which amended the Resource Conservation and Recovery Act (RCRA), established reporting and certification requirements to encourage generators to reduce the volume and toxicity of their hazardous wastes. Both HSWA and the Pollution Prevention Act of 1990 (PPA) identified a hierarchy of waste management options in which reduction at the source was the preferred option, followed in turn by environmentally-sound recycling, treatment, and finally disposal.

1.1.2 Waste Minimization National Plan Established Source Reduction and Recycling Goals and Promised Development of Risk Screening Tool

EPA translated the broad HSWA and PPA objectives into specific actions with the November 1994 release of the Waste Minimization National Plan (WMNP) (U.S. EPA 1994b). Stakeholders involved in development of the WMNP emphasized several themes, including:

- prioritize pollution prevention efforts based on risk;
- provide flexibility in implementing pollution prevention activities; and
- adopt a multi-media approach and prevent cross-media transfers.

The goals and objectives of the WMNP reflect these and other themes. The goals are:

- to reduce, as a nation, the presence of the most persistent, bioaccumulative, and toxic (PBT) chemicals in hazardous wastes by 25 percent by the year 2000 and by 50 percent by the year 2005;
- to avoid transferring these chemicals across environmental media; and
- to ensure that these chemicals are reduced at the source whenever possible, or, when not possible, that they are recycled in an environmentally sound manner.

One of the objectives of the WMNP, reflecting stakeholder needs, was to develop a flexible screening tool that would assist stakeholders in identifying source reduction and recycling priorities. EPA committed to fulfill this objective by developing a tool that would prioritize chemicals based on their "inherent hazard" (i.e., based on their persistence, bioaccumulation potential, toxicity, and quantity). EPA is now making a beta-test version of this screening tool, the WMPT, available for stakeholder review and initial application.

In addition to assisting stakeholders in identifying their priorities, EPA plans to use the WMPT as part of the process of identifying chemicals that are national priorities for waste minimization and that can be tracked to assess progress toward the WMNP goals. EPA used the WMPT to generate a list of chemicals ranked based on persistence, bioaccumlation, and toxicity (i.e., the *Draft Prioritized Chemical List*, or PCL, shown in Appendix D). The Agency plans to use the WMPT and PCL (after making any changes necessary based on public comments) to support the development of a shorter *National Waste Minimization Measurement List* that will be used to identify waste minimization initiatives and track WMNP progress.

1.1.3 EPA Adopted WMNP Goal as Part of Government Performance and Results Act Implementation

In 1993, Congress passed the Government Performance and Results Act (GPRA) as a means of promoting better planning and greater accountability in federal departments and agencies. Departments and agencies are required by the law to clearly describe their goals and objectives and track their progress toward them. GPRA has great significance, since progress made toward the goals and objectives will be used as a means of identifying federal priorities and making budget decisions.

EPA announced its GPRA-based planning, budgeting, and accountability system in 1996. One of the waste minimization subobjectives that EPA has identified is derived directly from the WMNP: by the year 2005, reduce the most persistent, bioaccumulative, and toxic compounds in our nation's hazardous waste streams by 50 percent as compared with a baseline year of 1991. In addition, a related GPRA activity was established following a 1997 GPRA stakeholder meeting: by 2000, reduce hazardous waste streams likely to contain PBT chemicals by 25 percent. This GPRA activity was intended to serve as a transitional goal that would allow EPA's regional and state partners to transition from a waste stream focus to a chemical focus in waste minimization. EPA plans to use the *National Waste Minimization Measurement List*, derived in part from the WMPT, to track national progress toward the GPRA objective and activity.

1.1.4 EPA Established Regional/State Team to Recommend Approach for Developing Risk Screening Tool

Since the EPA regions and states are key partners of EPA headquarters in implementing the WMNP, EPA's Office of Solid Waste (OSW) established a team of headquarters, regional, and state staff in September 1995 to foster development of the screening tool called for in the WMNP. The team clarified stakeholder needs for the tool (originally presented during development of the WMNP) and evaluated a large number of candidate risk screening tools that were in use or under development within EPA and outside the Agency.

Based on their analysis, the team recommended adopting and modifying the Use Cluster Scoring System (UCSS) developed by EPA's Office of Pollution Prevention and Toxics (OPPT) to create the

WMPT.[1] The UCSS is used by OPPT to score chemicals within "use clusters," or groups of chemicals that can substitute for one another in a given use (e.g., solvents that can substitute for one another in metal degreasing), and to score use clusters themselves.

The team identified a number of advantages of building on the UCSS, including:

- A large existing database of chemical data, allowing the efficient ranking of more chemicals based on the PBT criteria
- A technically sound methodology that had been peer reviewed by EPA's Science Advisory Board (SAB)
- The opportunity to work actively with another EPA program office and promote consistency in Agency chemical screening and pollution prevention approaches

The team also identified several areas where the UCSS could be improved, including:

- Adding in readily-available data to allow scoring of as many additional chemicals as possible (e.g., chemicals regulated under the Resource Conservation and Recovery Act, or RCRA)
- Strengthening the approach and data used to score ecological toxicity
- Restructuring the way that persistence, bioaccumulation, toxicity, and chemical quantity scores are aggregated

The last two areas for improvement were among those that had been identified by SAB during their review of the UCSS.

1.1.5 EPA's Office of Solid Waste Formed Partnership with EPA's Office of Pollution Prevention and Toxics to Develop WMPT

EPA's OSW subsequently entered into a cooperative arrangement with OPPT to modify the UCSS and create the WMPT. This joint project focused on making the suggested improvements listed above as well as others. These improvements are likely to benefit not only OSW and OPPT, but other EPA offices and stakeholder groups interested in using a consistent set of criteria as the basis for risk screening.

1.2 RATIONALE FOR WMPT RISK SCREENING APPROACH

One of the central issues discussed during development of the WMNP was whether the risk screening tool called for in the WMNP should focus on the characteristics of wastes prior to management (an approach referred to during discussions as "hazard as generated") or should focus on releases following management (referred to as "risk as managed"). An approach based on hazard as generated would focus on a few characteristics of chemicals in wastes (e.g., persistence, bioaccumulation potential, toxicity, and quantity) to generate a simple relative ranking of chemicals and wastes based on potential to produce risk given releases to the environment. It would answer the question: Which wastes are of greatest concern based on the chemicals they contain and potential risks they may pose, independent of how and where the wastes are managed? In contrast, an approach based on risk as managed would better reflect the risks posed by the wastes following management, based on any releases from the waste management unit, the fate and transport of these releases in the environment, and human or ecological exposures.

EPA selected the "hazard as generated" approach in developing the WMPT and identifying national waste minimization priorities. This section provides the rationale for this approach.

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[1] See discussion in *Waste Min: Where to Begin: Recommendations of the Waste Minimization Prioritization Team on Risk-Based Tools for Identifying Priority Chemicals and Wastes* (U.S. EPA 1996).

1.2.1 Focus of WMNP is on Prevention, Rather than Management

Subtitle C of RCRA includes stringent requirements for the management of hazardous wastes "from cradle to grave." These standards are intended to minimize present and future threats to human health and the environment from management of wastes. In contrast, the statutory language promoting source reduction and recycling (discussed above) focuses more on prevention of waste generation, encouraging reductions in the volume and toxicity of waste and movement of waste up the waste management hierarchy. This preventative approach is the foundation for the WMNP.

Although the preventative approach embodied in the WMNP focuses less directly on controlling risks from waste management, there are several important ways that prevention may complement or replace stringent management standards in reducing risks. First, even when management methods are operating effectively, there may still be small quantities of chemicals released on a continuing basis to the environment. Second, management technologies occasionally fail. For example, hazardous waste combustion units may experience "upsets" during which wastes may not be completely destroyed, and liner systems in hazardous waste management units may at some point develop leaks. Finally, wastes may inadvertently be released to the environment because of accidents during handling and transportation.

For chemicals that do not readily break down in the environment or that tend to accumulate in plant or animal tissues, even small ongoing releases are a concern, since they may allow the chemicals to accumulate over time. The accumulation of these chemicals in the environment is a particular concern when the chemicals are also toxic to humans or ecological systems.

1.2.2 Estimating Risk Can Be a Time- and Resource-intensive Process

Estimating the risks associated with wastes managed using a particular technology or managed in a particular location can be a time-consuming and costly process. When wastes can be managed by alternative management practices in various locations with different environmental and demographic characteristics, the estimation of risk becomes even more complex, requiring more sophisticated techniques and additional data. Given the potential variability in these factors influencing risk and the diverse universe of hazardous waste streams to be evaluated to identify waste minimization priorities, there are distinct advantages to adopting a simpler risk screening approach.

In addition to being time- and resource-intensive, more sophisticated risk screening approaches also tend to require more data than simpler screening approaches. As the data requirements for screening increase, the number of chemicals that can be screened decreases. When the EPA/state team working to select an approach for the WMPT discussed this tradeoff with stakeholder groups, a number of stakeholder representatives urged EPA to screen as many chemicals as possible, in order to identify potential substitutes for higher-scoring chemicals currently being used. By relying on the relatively simple screening criteria in the WMPT, EPA has been able to rank a significant number of chemicals, nearly 900 total to date.

The risk screening approach adopted in the WMPT attempts to convey as much information about the potential risk-related concerns associated with chemicals in wastes as possible without incorporating more detailed management, location, and exposure information.[2] This approach is quicker to implement, allowing more rapid progress toward the WMNP goals than an approach that attempts to estimate management- or site-specific risks. Although EPA adopted this approach for the WMPT, this does not

[2] Although the persistence and bioaccumulation criteria that form part of the foundation for the WMPT chemical scoring approach depend to some extent on environmental conditions, they are primarily dependent on a chemical's identity and can often be predicted from basic physical/chemical properties.

prelude stakeholders from using more sophisticated risk screening approaches to identify their own waste minimization priorities.

One criterion that stakeholders have suggested combining with the persistence, bioaccumulation, toxicity, and quantity criteria in the WMPT chemical scoring algorithm is mobility. Mobility is a broad criterion that encompasses a number of different processes by which chemicals may move in environmental media and reach receptors; consequently, it is an important criterion influencing the potential for exposure. While EPA is interested in considering mobility as a scoring criterion, it is not clear how this can be done without significantly increasing the overall sophistication of the scoring approach (e.g., by moving toward pathway-specific scoring of chemicals) and potentially reducing the number of chemicals that can be scored. One alternative to integrating mobility in the scoring that EPA is considering is to provide indicators of chemical partitioning to various environmental media as supplemental information in the WMPT.

1.2.3 PBT Criteria Are Important Characteristics for Chemical Risk Screening

Persistence, bioaccumulation, and toxicity (the PBT criteria) are three characteristics of chemicals that are considered to be important determinants of potential adverse effects to human health and the environment (i.e., potential risks) associated with actual or potential releases of chemicals. In the standard risk assessment paradigm (or framework) that guides current risk assessment practices, toxicity is a characteristic reflecting the nature and severity of adverse effects in response to a given exposure, while persistence and bioaccumulation potential are two of the characteristics that influence the extent of exposure to (or contact with) chemicals. (See definitions in text box.)

Chemical mass (i.e., chemical quantity) is another important criterion used in the WMPT to represent potential for exposure. Where a waste contains two chemicals with similar levels of concern based on the PBT criteria, if one chemical is present in significantly larger quantities (i.e., has significantly greater mass), it will likely present greater potential for exposure and risk and therefore be a higher priority, other things being equal. See Appendices A through C for additional discussion of persistence, bioaccumulation, toxicity, and mass.

There is significant domestic and international interest in, and use of, the PBT criteria for chemical risk screening. For example:

- PBT criteria are used in numerous risk screening methodologies developed by EPA and others, both domestically and internationally.

- Several international efforts have focused on chemicals that are persistent and/or bioaccumulative (e.g., the Great Lakes Binational Toxics Strategy (Binational Toxics Strategy, 1997), and the United Nations Economic Commission for Europe List of Persistent Organic Pollutants (UNECE, 1991).

- At a February, 1995, Society of Environmental Toxicology and Chemistry international workshop to develop guidelines for chemical ranking and scoring, participants recommended the PBT criteria for ecological risk screening and were considering them for human risk screening (recommendations for human risk screening are still under discussion).

- The Chemical Manufacturers Association (CMA) recognized the increasing domestic and international interest in chemicals that are persistent, toxic, and bioaccumulative in a recent policy guidance, which stated that "because of their physical/chemical properties, PBT chemicals should receive priority attention in industry risk characterization, risk management, and pollution prevention programs" (CMA, 1996).

Definitions

Risk—the likelihood that a chemical will cause adverse effects to human health or the environment. Risk is a function of toxicity and exposure.

Toxicity—the tendency of a chemical to produce adverse effects in organisms following exposure. Toxicity is a very broad criterion, covering different effect types (e.g., human and ecological), exposure periods (e.g., acute and chronic), and endpoints (e.g., lethality, cancer effects, and non-cancer effects (such as developmental effects)). At similar levels of exposure, chemicals with higher toxicity will pose greater risks than chemicals with lower toxicity.

Exposure—the extent and nature of contact of an organism with a chemical (i.e., the amount of chemical available to be taken up through surfaces such as the lungs and skin). Exposure is a function of a number of factors, including chemical release rates, fate and transport in the environment, duration of exposure, and size of exposed populations. Several important predictors of exposure are persistence, bioaccumulation potential, and mass.

Persistence—the tendency of a chemical to remain in the environment without transformation or breakdown into another chemical form (e.g., to require a relatively long period of time to be degraded by microorganisms and/or by chemical processes). Relatively speaking, the greater the persistence of a chemical, the greater the potential for human or ecological exposure to the chemical. Persistence is a more important criterion for assessing risks of long-term (i.e., chronic) exposures than short-term exposures.

Bioaccumulation potential—the capacity of a chemical to increase in concentration or accumulate (be stored in tissue) in an organism as a result of uptake from all environmental sources over a period of time. Relatively speaking, the greater the bioaccumulation potential of a chemical, the greater the potential for magnification of chemical concentrations in food chains and for human and ecological exposures. Bioaccumulation potential is a more important criterion for assessing human and ecological risks via food chain exposure pathways than risks from direct exposure pathways (e.g., direct inhalation).

Mass—the quantity of a chemical (e.g., in a waste stream) that is potentially available for release to the environment. Relatively speaking, the greater the mass of the chemical, the greater the potential for human and ecological exposure.

1.2.4 A Simple Chemical Screening Approach Is a Step Toward More Fully Considering Risk in Decision-making

There are a number of factors that can be considered in making decisions about waste management and waste minimization alternatives. Currently, it is not uncommon for priorities to be established based on where the greatest cost savings will be achieved or where the largest waste or chemical quantities will be reduced, without consideration of which chemicals are present or whether they are dilute or concentrated (let alone consideration of management- or site-specific risk).

To the extent that additional information on relative risks of chemicals in waste streams can be integrated in decision-making, it will help promote improved environmental results. The use of PBT criteria (and chemical quantity) for identifying potential chronic risk concerns is a step in that direction. If desired, the risk screening results that the WMPT provides can potentially be used along with

supplemental management and exposure information to more closely approximate site-specific risk concerns. Relative rankings of chemicals based on other environmental concerns (e.g., potential to result in acute risks, stratospheric ozone depletion, global warming, photochemical oxidant (smog) formation, acidification, or nutrification) can also complement the PBT rankings.

1.3 CONCEPTUAL OVERVIEW OF THE WMPT

This section introduces the two main components of the tool: the scoring algorithm and the supplemental chemical information. This section also provides an overview of the universe of chemicals addressed in the WMPT. For additional technical detail on the scoring algorithm and the supplemental information, refer to Appendices A through F.

As shown in Exhibit 1-1, the first main component of the WMPT is the scoring algorithm that establishes an overall chemical score based on underlying data that reflect the chemical's human health risk potential and ecological risk potential. There are various factors and subfactors that are assessed to generate scores for a chemical's human health risk and ecological risk potentials; these are discussed later in this section. The overall chemical score for a given chemical can be used along with similar scores for other chemicals to develop a relative ranking for those chemicals.

The second main component of the WMPT structure is a supplemental information database that provides chemical-specific data that are not used directly in generating the overall chemical scores (and are thus shown in Exhibit 1-1 as being connected with the overall chemical score by dashed arrows). This information can be used, along with the chemical scores or independently, to inform waste minimization decisions.

1.3.1 Scoring Algorithm of the WMPT

The purpose of the WMPT scoring algorithm is to develop chemical-specific scores that can be used for a screening-level risk-based ranking of chemicals. As illustrated in Exhibit 1-1, the scoring algorithm is designed to generate an overall chemical score that reflects a chemical's potential to pose risk to both human health and ecological systems. A measure of human health risk potential is derived, consistent with the risk assessment paradigm, by jointly assessing the chemical's human toxicity and potential for exposure. Similarly, a measure of the ecological risk potential is derived by jointly assessing the chemical's ecological toxicity and potential for exposure.

The details of how an overall chemical score is generated are summarized in Exhibit 1-2. Mathematically, the overall chemical score is the sum of two "potential-level" scores, one reflecting the human health risk potential and the other the ecological risk potential of the chemical.

The Human Health Risk Potential score is derived by adding two "factor-level" scores, one reflecting the chemical's toxicity to humans and the other the chemical's potential for exposure. While designed as a screening-level tool, the WMPT's structure is generally consistent with the risk assessment paradigm that guides current risk assessment practices. The WMPT's scoring algorithm is modeled after the general risk calculation equation used by U.S. EPA and others, where a chemical's risk is derived by combining estimates of the chemical's toxicity with estimates of the chemical's actual or potential exposure. The WMPT uses a small number of relatively simple measures to represent a chemical's toxicity and exposure potential, consistent with a screening-level approach and with other systems of this type. There are several such measures, called "subfactors," used in the tool, and it is at the subfactor level that WMPT actually evaluates chemical-specific data and generates scores.

The Human Toxicity factor score is derived by taking the higher of two subfactor scores: (1) Cancer Effects, and (2) Noncancer Effects. The Human Exposure Potential score is derived as the sum of three subfactor scores: (1) Persistence, (2) Bioaccumulation Potential, and, when available, (3) Mass.

Similar to the Human Health Risk Potential score, the Ecological Risk Potential score is derived by adding two "factor-level" scores, one reflecting the chemical's toxicity to aquatic ecosystems and the other the chemical's potential for exposure. The Ecological Toxicity factor is scored currently using only one subfactor—Aquatic Toxicity. The Ecological Exposure Potential score is derived in the same way as (and is equal to) the Human Exposure Potential score.

As shown in Exhibit 1-2, scores are first generated at the subfactor level and these scores are then "aggregated upward" to generate an overall chemical score. A score for a given subfactor is derived by evaluating certain "data elements" that appropriately represent that subfactor (examples of data elements for the various subfactors used in WMPT are shown in the last row of Exhibit 1-2). The data elements used to score the various subfactors are briefly described below; a detailed description of the types of data used is provided in Appendices B and C.

- **Persistence.** To score this subfactor, the WMPT algorithm uses data elements derived from (1) models predicting estimated biodegradation times, (2) databases of empirical biodegradation data, and (3) a model predicting hydrolysis half-life values for chemicals.

- **Bioaccumulation Potential.** The WMPT scoring algorithm uses three data elements to score this subfactor. For most organic chemicals, the estimated logarithm of the n-octanol-water partition coefficient (K_{ow}) is used. For metals and some organic chemicals, measured Bioaccumulation Factors (BAFs) or Bioconcentration Factors (BCFs) are used.

- Mass. The WMPT scoring approach can use several types of data to indicate the mass (or quantity) of the chemical in wastes, depending on the kind of data sources accessible to the user (e.g., Toxics Release Inventory data or waste analysis data).

- **Human Toxicity - Cancer Effects.** For this subfactor, the WMPT scoring approach uses measures related to the chemical's carcinogenic potency (e.g., Slope Factors) and the likelihood that the chemical is a human carcinogen (e.g., the U.S. EPA Carcinogen Weight-of-Evidence (WOE) Classification).

- **Human Toxicity - Noncancer Effects.** For this subfactor, the WMPT scoring approach uses various data elements indicative of the chemical's capacity to cause chronic adverse effects in human receptors, and the magnitude and severity of those effects (e.g., Reference Dose (RfD)).

- **Ecological Toxicity - Aquatic Toxicity.** To score this subfactor, the WMPT uses a number of data elements representing chronic and acute aquatic toxicity extracted from a number of U.S. EPA sources (e.g., Final Chronic Values, measured and estimated aquatic chronic values, EC_{50}s, LC_{50}s, and aquatic toxicity reportable quantities).

The WMPT is designed to take advantage of the best available data for chemical scoring. Data elements are generally grouped into three categories of data quality, i.e., high-, medium-, or low-quality, and higher quality data are used preferentially, when available, for the scoring. To score the Noncancer Effects subfactor, for example, any of the higher quality data elements, e.g., the Reference Doses (RfDs), are used preferentially over the medium or low quality data elements, e.g., Chronic No Observed Adverse Effect Levels (NOAELs) or Human Health Structure-Activity Team (SAT) ranks. (See Appendix C for a

EXHIBIT 1-1
Overview of the WMPT System

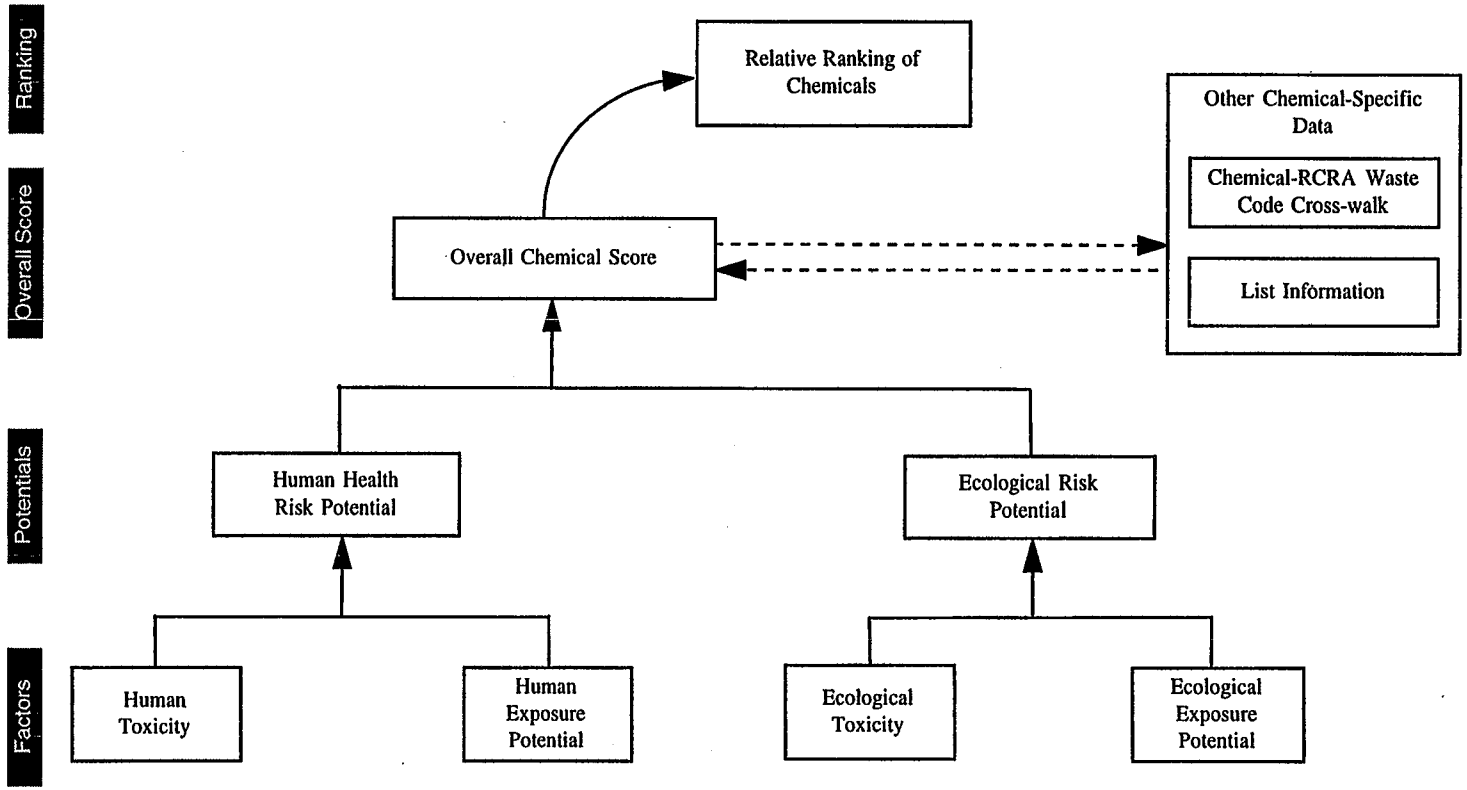
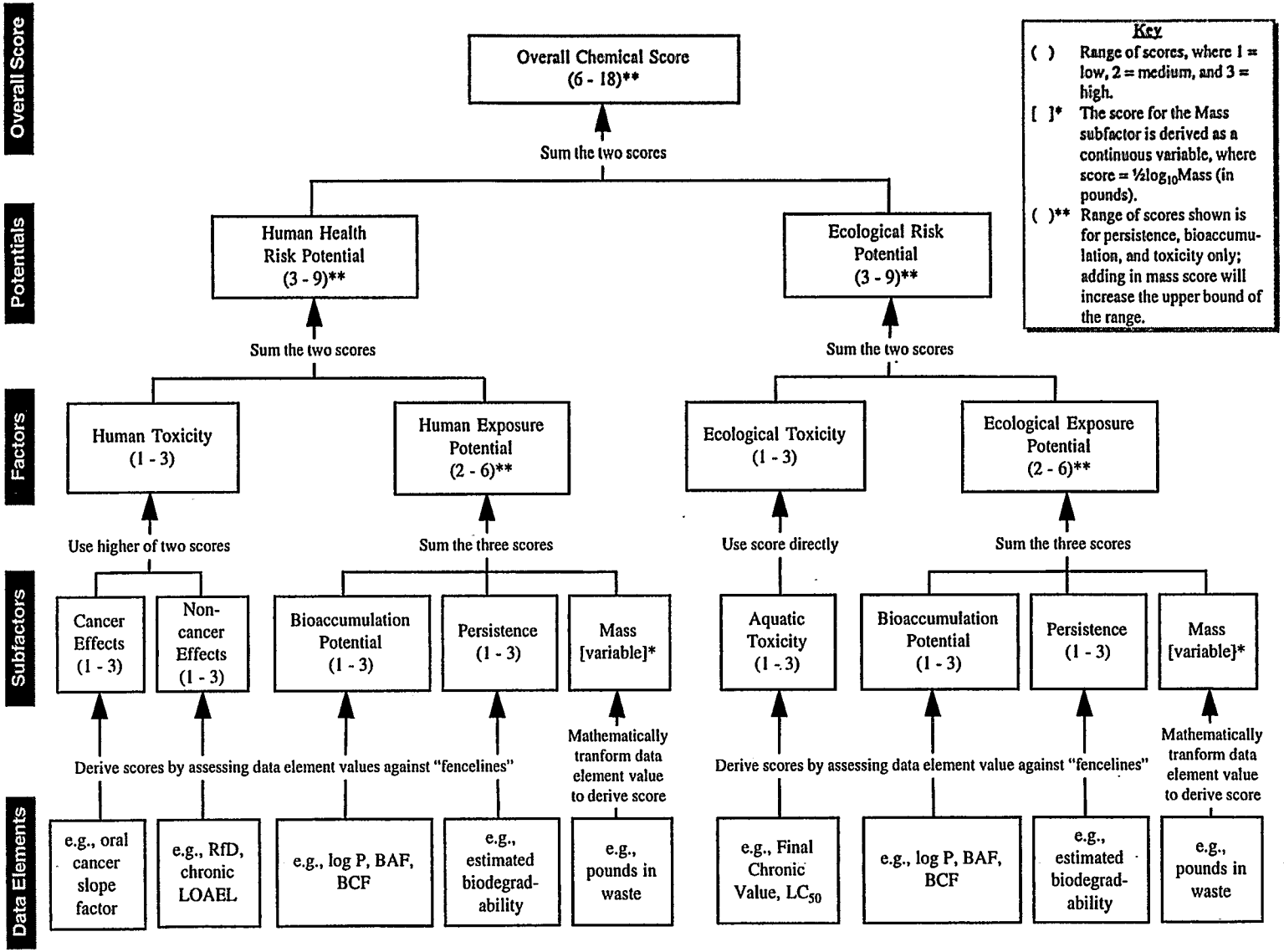


EXHIBIT 1-2
Overview of the WMPT Scoring



detailed explanation of these data elements.) Allowing the use of data of varying quality in the WMPT ensures that a large number of chemicals can be assigned scores based on their persistence, bioaccumulation, and toxicity properties, while taking advantage of the high quality data that are available. In compiling the underlying database for scoring chemicals in the WMPT, U.S. EPA searched readily-available sources and incorporated persistence, bioaccumulation, and toxicity data for a given chemical, starting with the highest quality data element and working down through the data quality hierarchy.

In selecting the types of data elements to be used to score the various subfactors in the WMPT, U.S. EPA has worked to maintain consistency with approaches used in other chemical screening methods and systems, particularly those developed and used within the Agency. For example, the highest quality data element used to score the Aquatic Toxicity subfactor is the Final Chronic Value (FCV), a measure of chronic aquatic toxicity. The use of an FCV as the highest quality data element is consistent with methods used in other U.S. EPA initiatives such as OSW's *Hazardous Waste Identification Rule: Risk Assessment for Ecological Receptors,* and Office of Water's data quality hierarchy for the Great Lakes Water Quality Initiative. FCVs were also presented as high quality data elements in U.S. EPA's Office of Emergency and Remedial Response's compilation of Ecotox Thresholds for the Superfund program. Similarly, most of the measures used in scoring human toxicity are standard data elements used by U.S. EPA in risk assessment and risk screening procedures. The general consistency of the WMPT approach to scoring subfactors with other Agency approaches is discussed further, by subfactor, in Appendices B and C.

Most of the subfactors are scored using a "fenceline" approach (as discussed further in Appendix A). The fenceline scoring approach involves comparing the value for a given chemical data element against predefined "high" and "low" threshold values for that data element, termed "fencelines." In general, for most data elements, lower numeric values denote higher concern. For example, the more toxic chemicals are represented by lower numerical values for Reference Doses (RfDs). Thus, if the chemical-specific value for the given data element is greater than the "low" fenceline, the subfactor is assigned a score of 1 (low concern). If the chemical-specific value is less than the "high" fenceline, the subfactor is assigned a score of 3 (high concern). If the chemical's value for that data element is between the "high" and the "low" fencelines, the subfactor is assigned a score of 2 (medium concern). Thus, all the subfactors, except Mass, are scored as low (score = 1), medium (score = 2), or high (score = 3).[3] Mass is assigned a score (on a continuous scale) equal to half the $base_{10}$ logarithm of the chemical mass (in units of pounds per year).

In general, the fencelines used in the WMPT are also consistent with approaches used in similar chemical screening methods and systems used in the Agency. For example, the WMPT fencelines used to score the chronic aquatic toxicity data elements (e.g., FCVs) are nearly identical to the environmental toxicity classification criteria that OPPT uses to evaluate industrial chemicals under the Toxic Substances Control Act (see also discussion in Appendices B and C).

1.3.2 Supplemental Information

During earlier discussions related to selection and development of a risk screening tool for the WMNP, stakeholders expressed an interest in several types of supplemental information to assist in decision-making. Stakeholders were particularly interested in obtaining information on chemicals' regulatory status, the "linkage" between RCRA waste codes and chemicals, and chemicals' partitioning to and transport in environmental media. At present, only the first two types of supplemental information are included in the WMPT. U.S. EPA plans at a later time to include supplemental data on chemical partitioning to various environmental media.

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[3] For some data elements, e.g., the cancer potency slope factor, lower numeric values denote lower concern; in such cases, the fenceline logic is reversed.

Chemical-RCRA Waste Code Cross-walk

The *Chemical-RCRA Waste Code Cross-walk*, discussed further in Appendix F, provides a translation between approximately 500 chemicals and 600 RCRA hazardous waste codes. The cross-walk can be used for two purposes: (1) to identify RCRA waste codes (and, subsequently, waste streams) that are likely to contain a particular chemical, or (2) to identify chemicals associated with particular RCRA waste codes (and waste streams). On one axis of the cross-walk are RCRA waste codes, and on the other axis are chemical names (with CAS numbers). The cells in the table include notations that indicate if an association exists between a chemical and a waste code. The cross-walk is broken down into individual tables for each of the five types of RCRA waste codes (D, F, K, P, and U) and for wastewater and non-wastewater forms of waste, resulting in a total of 10 tables. The data included in the cross-walk linking RCRA waste codes and their associated chemicals come from three U.S. EPA sources: (1) hazardous waste listings, (2) Land Disposal Restrictions treatment standards, and (3) Hazardous Waste Identification Rule database. (See Appendix F for more discussion of the cross-walk.)

Lists of Concern

As an indicator of prior and current regulatory and non-regulatory attention, each chemical in the WMPT is cross-referenced with the chemicals on the 17 lists below.

- RCRA Hazardous Waste Constituents, P-List (40 CFR 261.33) (acute hazardous waste)
- RCRA Hazardous Waste Constituents, U-List (40 CFR 261.33) (toxic wastes)
- RCRA Section 3001 Hazardous Wastes, Appendix VIII Hazardous Constituents (40 CFR 261)
- RCRA Section 3001 Hazardous Wastes, Appendix IX Ground Water Monitoring List (40 CFR 264)
- Superfund Amendments and Reauthorization Act, Section 313 (40 CFR 372.65) (Toxics Release Inventory (TRI) chemicals)
- Superfund Amendments and Reauthorization Act, Section 302(a)(2) (40 CFR 355, Appendix A)
- Superfund Amendments and Reauthorization Act, Section 110 (52 FR 12866, April 17, 1987; 53 FR 41280, October 26, 1988; 54 FR 43615, October 17, 1990)
- Clean Air Act Amendments Title III Hazardous Air Pollutants (PL 101-549, Section 301)
- Clean Air Act Amendments Section 602 and the Clean Air Section 112(r) (PL 101-549, Section 602(b))
- Chemicals on TSCA Reporting Rules database (CORR)
- OPPT Toxics Master Testing List
- Clean Water Act Priority Pollutants (40 CFR 423, Appendix B)
- Clean Water Act Section 311(b)(2) Hazardous Substances (40 CFR 116.4)

- Safe Drinking Water Act Contaminants (40 CFR 141.11, .12, .13, .15, .16, .61, .62, .63; 56 FR 1470, January 14, 1991)
- Occupational Safety and Health Administration (OSHA) - Permissible Exposure Limits (PELs)
- National Institute for Occupational Safety and Health (NIOSH) - Recommended Exposure Limits (RELs)
- American Council of Governmental Industrial Hygienists (ACGIH) - Threshold Limit Values (TLVs)

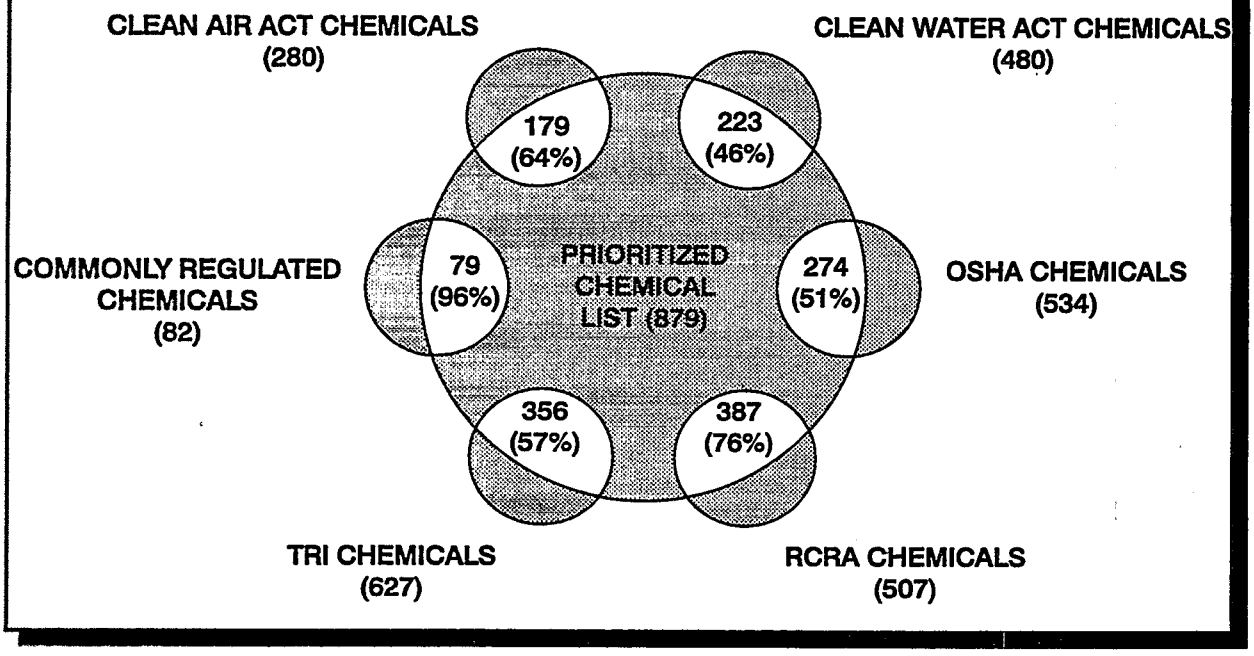
Finding a chemical of interest on one or more of these lists can serve as an indicator of additional information for that chemical, such as the U.S. EPA program offices concerned and knowledgeable about the chemical. Also, finding a chemical on multiple lists might be interpreted as indicating heightened regulatory and/or non-regulatory interest in that chemical. These lists are provided for informational purposes only, and are not incorporated into any of the WMPT scoring algorithms.

1.3.3 Universe of Chemicals Addressed by WMPT

One of the main strengths of WMPT is its wide coverage of chemicals that may be of potential concern to users. The WMPT currently includes approximately 4,700 chemicals. These are primarily chemicals listed on the TSCA Inventory, and in particular, those that are actually in commerce. Of the more than 4,700 chemicals included in the WMPT, approximately 880 have data on persistence, bioaccumulation, and toxicity and are included on the Draft PCL. (See Appendix D for more information on the PCL.) U.S. EPA had focused its data gathering efforts on those chemicals in the WMPT that are covered by RCRA and other regulatory programs. Thus, a large number of the chemicals on the PCL are covered by those programs. Exhibit 1-3 presents how the PCL overlaps with the following lists of concern:

- RCRA chemicals (i.e., Appendix VIII Hazardous Constituents, constituents on the Appendix IX Ground Water Monitoring List, and constituents listed as RCRA P and U wastes);
- TRI chemicals (i.e., the Superfund Amendments and Reauthorization Act Section 313 Toxic Chemicals);
- U.S. EPA's Water Program (i.e., Clean Water Act (CWA) Section 307(a) Priority Pollutants and CWA Section 311 Hazardous Substances);
- U.S. EPA's Air Program (i.e., Clean Air Act (CAA) Section 112(b) Hazardous Air Pollutants and CAA Section 112(r) List of Substances for Accidental Release Prevention);
- OSHA chemicals (i.e., chemicals for which OSHA adopted Permissible Exposure Limits (PELs) in 1989); and
- "Commonly regulated chemicals," i.e., chemicals regulated in common among the U.S. EPA programs (i.e., RCRA, TRI, and U.S. EPA's air and water programs).

EXHIBIT 1-3
Overlap Between the Draft Prioritized Chemical List and Various Chemical Lists



For example, the exhibit shows that of the 507 chemicals that fall under the heading of RCRA chemicals, 387 (or 76 percent) are on the PCL. Nearly all of the "commonly regulated chemicals" appear on the PCL, along with about three-quarters of RCRA chemicals, two-thirds of Clean Air Act chemicals, and roughly half of the TRI, OSHA, and Clear Water Act chemicals.

1.4 PUTTING WMPT IN CONTEXT

In using this type of decision-making tool, it is important to understand the nature of the tool and its limitations, so that it can be applied appropriately. This point was emphasized by stakeholders during development of the WMPT. Users should keep the following points in mind when applying the WMPT.

- **The WMPT is intended to provide relative rankings of chemicals rather than absolute risk results.** The WMPT is a simple risk screening tool that is intended to provide relative rankings of chemicals, as an initial step in a risk screening process. It is not intended to indicate the absolute level of risk (e.g., the likelihood of cancer or non-cancer effect in humans) associated with a chemical in a particular setting, since that risk is a function of many other site-specific factors. Given the simple screening approach, the chemical rankings may include considerable uncertainty. Chemicals ranked low by WMPT should not be interpreted as being risk-free, since all chemicals may pose concerns under certain conditions.

- **The WMPT was developed by EPA's OSW under the WMNP to serve as voluntary guidance in identifying priorities.** Stakeholders felt strongly that the WMNP, as a voluntary program, should provide participants with flexibility in establishing individual goals and implementing waste minimization. Consequently, the WMPT is intended to

provide a means of identifying priorities for stakeholders who have not done their own assessment of risk-based waste minimization priorities. The WMPT is not intended to preclude stakeholders from selecting and using alternative risk-based approaches to identify their priorities.

- **Results from the WMPT should be balanced with other factors in decision-making, as appropriate.** Stakeholders emphasized that other factors, in addition to risk, are important in making decisions about waste minimization and management. For example, regulatory compliance costs and the feasibility of waste minimization alternatives are important factors for many businesses in identifying waste minimization priorities. The intent of the WMPT is to encourage stakeholders to more fully balance risk with these other considerations in decision-making.

- **Chronic risk rankings from the WMPT can complement other chemical risk rankings.** The WMPT focuses on chronic (long-term) risks to human health and ecological systems. Users may want to consider other chemical risk ranking results related to acute (short-term) risks, stratospheric ozone depletion, acidification, and nutrification, among others.

- **The prioritization of chemicals based on the PBT criteria can complement, but should not be viewed as replacing, existing lists of regulated chemicals, which are often an important means of identifying source reduction and recycling priorities.** PBT priorities, as determined by the WMPT, can potentially complement these regulatory lists in a couple of ways. First, when identifying source reduction priorities among regulated chemicals, PBT priorities can complement other factors such as cost in decision-making. Regulated constituents that are "more PBT" would be a higher priority, other things being equal. Second, for chemicals that are not regulated currently, PBT evaluations can provide an indication of the potential for environmental concerns.

- **The list of chemicals ranked by the WMPT includes many, but not all, chemicals.** Some chemicals of interest to users may not appear among the 900 chemicals on the Draft PCL, since only chemicals with readily available data for persistence, bioaccumulation potential, and human and ecological toxicity were scored and included on the list. The fact that a chemical does not appear on the list should not be interpreted as meaning that it is not a concern. The WMPT does provide partial chemical data for an additional 3,800 chemicals that were not ranked and included on the PCL.

- **The Chemical-Waste Code Crosswalk indicates when chemicals may be associated with particular waste streams.** Given that the associations are based on national-level waste characterization data, compiled over a number of years, they may not correspond exactly to waste characteristics at a particular site and should be interpreted with caution.

- **Not all of the regulatory/non-regulatory lists may be current.** EPA compiled regulatory and non-regulatory lists that were readily available during development of the WMPT. While some lists have been quality checked and updated, not all lists may be current. Moreover, the various lists change over time, with chemicals added or deleted.

CHAPTER 2
USING WMPT 1.0

This chapter presents the step-by-step process of installing and using the WMPT to generate outputs that will aid in decisions about setting priorities. Most of this chapter will discuss how to maneuver within the system, how to input data and develop scores, and how to generate formatted outputs. Section 2.1 discusses how to get started, and sections 2.2-2.7 present the File, Edit, View, Score, Reports, and Help menus. Finally, Section 2.8, presents system error messages.

2.1 GETTING STARTED

The WMPT is a flexible chemical ranking tool that lets you input, view, and rank chemicals and chemical data. The WMPT already contains ecological and human exposure and hazard data for over 4,700 chemicals. You can view chemical data, group chemicals together, score and rank the chemicals relative to one another, and output the information in both a hardcopy and electronic formats.

To help you get familiar with the WMPT, this chapter discusses the following WMPT menu items and features:

- Hardware requirements and installing WMPT 1.0;
- Viewing and editing chemicals, chemical data, and chemical lists;
- Changing data fencelines, inputting mass data, and scoring chemicals;
- Generating reports;
- Help system; and
- Basic troubleshooting

2.1.1 Hardware and Software Requirements

WMPT is a 16 bit windows application that can be installed and run on Windows® 3.x, Windows® 95, Windows® NT 3.5, or Windows® NT 4.0.

WMPT contains a large database, and accessing this database takes considerable resources. The minimum PC configuration requirements are:

- A minimum of 16 megabytes of RAM;
- 486-66 or Pentium 90 processor (P90);
- 15 megabytes of free disk space;
- A 1.44 floppy disk drive; and
- A Windows-compatible mouse (highly recommended but not required)

2.1.2 Installing WMPT

To install the WMPT from Windows® 3.1 or Windows® NT 3.5:

1. Exit from any open applications, including tool bars;
2. Insert installation disk 1 into your floppy drive;
3. From the Windows **FILE** menu, select *Run...*;
4. Type 'A:\SETUP' or 'B:\SETUP' as appropriate.

To install the WMPT from Windows® 95 or Windows® NT 4.0:

1. Exit from any open applications, including tool bars;
2. Insert installation disk 1 into your floppy drive;
3. From the Windows **START** menu, select *Run...*;
4. Type 'A:\SETUP or 'B:\SETUP' as appropriate;

Note that the install may not require all disks if necessary files are already resident on your PC.

5. The install will prompt you to enter a name for the directory in which WMPT 1.0 will be installed.

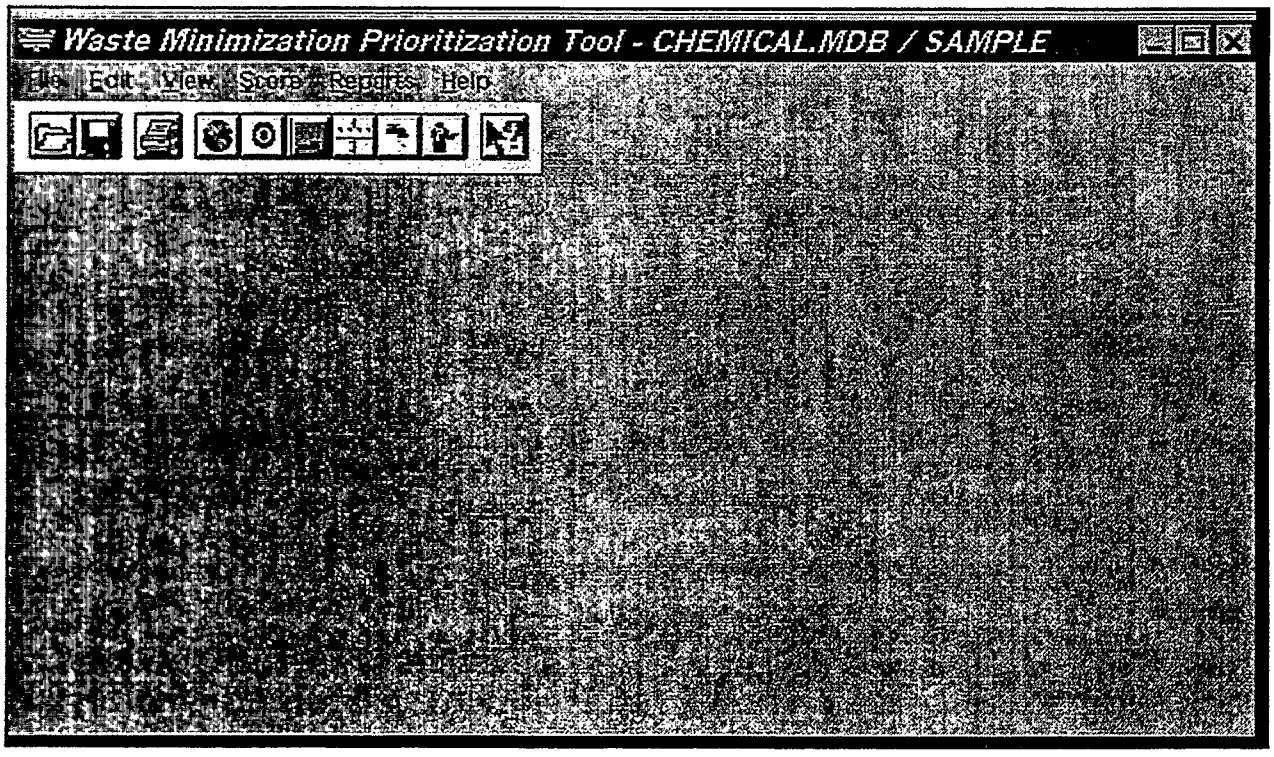
6. Follow the instructions on the screen.

2.1.3 Starting and Running WMPT 1.0

From Windows® 3.X or NT® 3.5, double click on the WMPT icon. From Windows® 95 or Windows® NT 4.0 navigate the start menu to find WMPT and select it.

After starting WMPT, the application opens and both a WMPT menu bar and speed button tool bar appear. Notice that the **Edit**, **View**, **Mass**, **Score**, and **Reports** menus are not active. Select the **File** menu, select *Open*, select the CHEMICAL.MDB file and click on OK to activate the **Edit**, **View**, **Mass**, **Score**, and **Reports** menus. You must open a file each time you start WMPT to activate the **Edit**, **View**, **Mass**, **Score**, and **Reports** menus. The WMPT main screen shown in Exhibit 2-1 will appear.

EXHIBIT 2-1
WMPT Main Screen



2.1.4 WMPT Menus

Exhibit 2-2 describes the menus on the WMPT menu bar. Double clicking on any menu gives you access to the commands to perform the associated actions.

EXHIBIT 2-2
WMPT Menus

Menu Item	Description
File	Commands to open and save files. Also includes the WMPT exit command.
Edit	Commands to edit chemicals, chemical data, chemical lists, and the fencelines used in scoring algorithms.
View	Commands to view chemicals, fencelines, chemical and chemical list scores, and score distributions.
Score	Commands to generate chemical persistence scores, prioritized chemical list scores, and mass scores.
Reports	Commands to generate the fenceline report, chemical list report, and chemical data summary report. Also contains commands to create and run an advanced report query (ad hoc reporting).
Help	Commands to access the WMPT on-line help system.

Several shortcut keys are available on the WMPT tool bar. Click on the toolbar icon shown in Exhibit 2-3 to activate the shortcut.

EXHIBIT 2-3
WMPT Tool Bar

Icon	Action	Description
	File Open	Shortcut to access the screen which lets you select a file to open.
	File Save	Shortcut to save the current open file.
	Print	Shortcut to print screen.

Icon	Action	Description
	View Chemicals by CAS Number	Shortcut to access the chemical view screens after selecting a chemical by CAS number.
	View Scores by CAS Number	Shortcut to access the chemical PBT score summary after selecting a chemical by CAS number.
	View Chemicals by RCRA Codes	Shortcut to view chemical data for all chemicals in WMPT for a specific RCRA code.
	View Fencelines	Shortcut to view scoring fencelines used to generate PBT scores.
	View Mass Detail	Shortcut to view available mass data.
	Advanced Report Query	Shortcut to access the Advanced Report Query (Ad-hoc reporting).
	Help	Shortcut to display context sensitive help.

Each WMPT menu and menu command is discussed in detail in sections 2.2 through 2.7

2.2 FILE MENU

The File menu contains the commands listed in Exhibit 2-4.

EXHIBIT 2-4
File Menu Commands

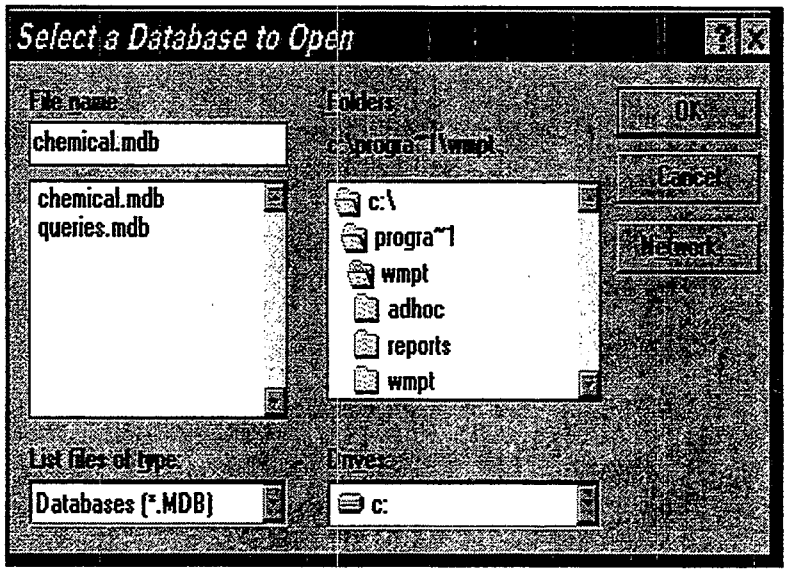
Command	Description
Open	Open a file to be used in each WMPT session.
Close	Close an open file.
Save	Save an open file.
Save As	Save an open file under a new name.
Define Mass Table	Add a table of chemical mass data to the WMPT.
Switch Mass Tables	Switch to another attached, imported, or manually-entered table of chemical mass data or delete a chemical mass data table from the WMPT.
Exit	Exit WMPT.

Each of the **FILE** menu commands are discussed in detail in the following subsections.

2.2.1 Opening a Database

After selecting the *Open* from the **File** menu, the *Select A Database to Open* screen shown in Exhibit 2-5 appears. The WMPT install places a CHEMICAL.MDB file in the directory from which the WMPT is run. You can edit the data in this file and save the edited file under the original CHEMICAL.MDB name or under a new name (see *Save* and *Save As* below). Selecting *Open* from the **File** menu displays the CHEMICAL.MDB file and any other file names to which you have saved an edited version of the CHEMICAL.MDB file.

EXHIBIT 2-5
Select a Database to Open Screen



To open a file, double click on the desired file name or click once on the file name and click OK. Opening a file activates the **Edit, View, Mass, Score** and **Reports** menus. To see a description of the available files, click on description, click on a file name, click OK, and the file description will appear. (Note: This option is not yet complete.)

Note: To help you keep track of which database is open, the name of the database is added to the title bar that appears at the top of the WMPT screen. For example, before a database is open, the title bar reads "Waste Minimization Prioritization Tool." After the CHEMICAL.MDB file is opened, the title bar reads "Waste Minimization Prioritization Tool - CHEMICAL.MDB."

2.2.2 Closing a Database

To close a database, select *Close* from the **File** menu. This will close the open file.

2.2.3 Saving a Database

To save a database, select *Save* from the **File** menu. This saves the open database under it's current name.

2.2.4 Renaming a Database

To rename or save a database under a new name, select *Save As* from the **File** menu. Enter a new name for the database in the space provided and click on OK. This saves the open database under a new name. Click on CANCEL to exit *Save As* without saving the database under a new name.

2.2.5 Adding a Mass Data Table

You can add chemical mass data to the WMPT system by selecting *Add Mass Data* from the **File** menu. The *What Is Mass Data* screen appears and explains how the mass data can be broken down into various levels of aggregation (e.g., by SIC code, EPA Region). After you have read the information, click on NEXT to advance to the next screen. Click on CANCEL to exit the *Add Mass Data* procedure.

After clicking on NEXT in the *What Is Mass Data* screen, a screen appears which asks how the mass data will be incorporated. Click on one of the following options to select the method by which the mass data will be incorporated:

- *Attach to an existing database or spreadsheet;*
- *Import a CSV file; and*
- *Type in data manually.*

Each of these options starts a series of screens that guide you through the process of adding mass data to the WMPT. After selecting one of the options, click on NEXT to advance to the first step of the selected option. Click on BACK to go back to the *What Is Mass Data* screen. Click on CANCEL to exit the *Add Mass Data* procedure. Each of the options for adding mass data is described in detail in the following subsections.

Attaching To An Existing Database or Spreadsheet

If the mass data is contained within an existing database table or spreadsheet, WMPT allows you to attach to that external data file. Before attaching to the data file, you must know the name of the specific table or worksheet, the location and name of the database or spreadsheet file, and the specific type of file you are attaching to (e.g., Access®, dBase IV®). **NOTE: This database table or spreadsheet must**

contain specific column or field formats so that WMPT can utilize the data that is contained in the external source. Exhibit 2-6 contains the required formats for the external database table or spreadsheet.

The steps for attaching to an existing database or spreadsheet are listed below:

Step 1 - Naming the Attachment File;

Step 2 - Defining Attachment Parameters;

Step 3 - Locating the Attachment File;

Step 4 - Identifying Mass Data Field Names; and

Step 5 - Confirming the Attachment.

EXHIBIT 2-6
External Mass Data Required Field/Column Names and Formats

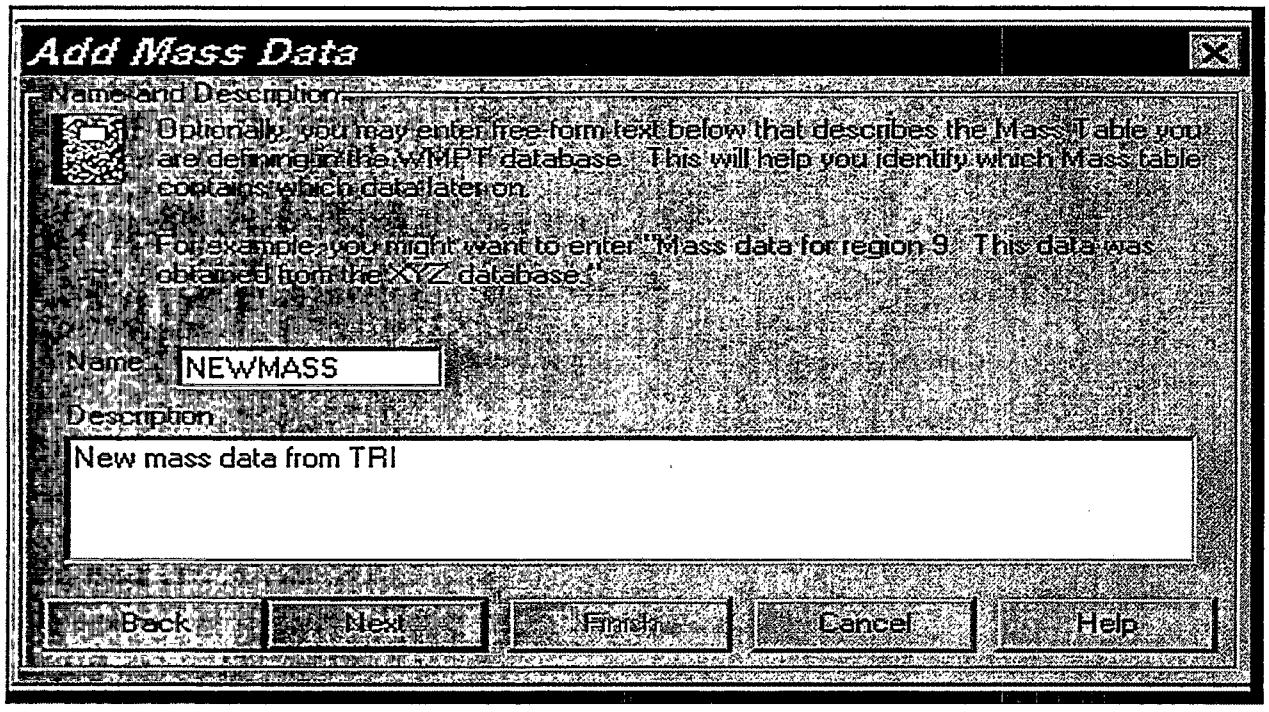
Mass Data Element	Required Field/Column Name	Required Field/Column Format
Mass Data Record Number*	MASSID	Numeric Long (1 - 2,147,483,647)
Mass Amount*	MASS	Numeric Single
Chemical CAS Number*	CASNUMBER	Numeric Long
Waste Stream Identifier	WASTESTREAM	Numeric Integer (0 - 255)
EPA Facility Code	EPAID	Text (12 characters)
SIC Code	SICCODE	Numeric Integer
State Code (e.g., AZ)	STATE	Text (2 characters)
EPA Region Number	REGION	Numeric Integer

* The database table or spreadsheet MUST have a unique mass id for each mass record in the table or spreadsheet. Each mass record must also contain a CAS number. The remaining optional data elements are listed in order of decreasing aggregation.

Attaching to an External Source Step 1 - Naming the Attachment File

The *Name and Description* screen is shown in Exhibit 2-7. Create a name for the attachment file that the WMPT will use to identify the mass data table or spreadsheet when switching from one set of mass data to another (see Section 2.2.6, *Switching to Another Mass Data Table*) by clicking on the space to the right of *Name:* and entering a mass data name. As an option, you can also enter a description of the mass data in the space below *Description* by clicking and entering in the description.

EXHIBIT 2-7
Name and Description Screen



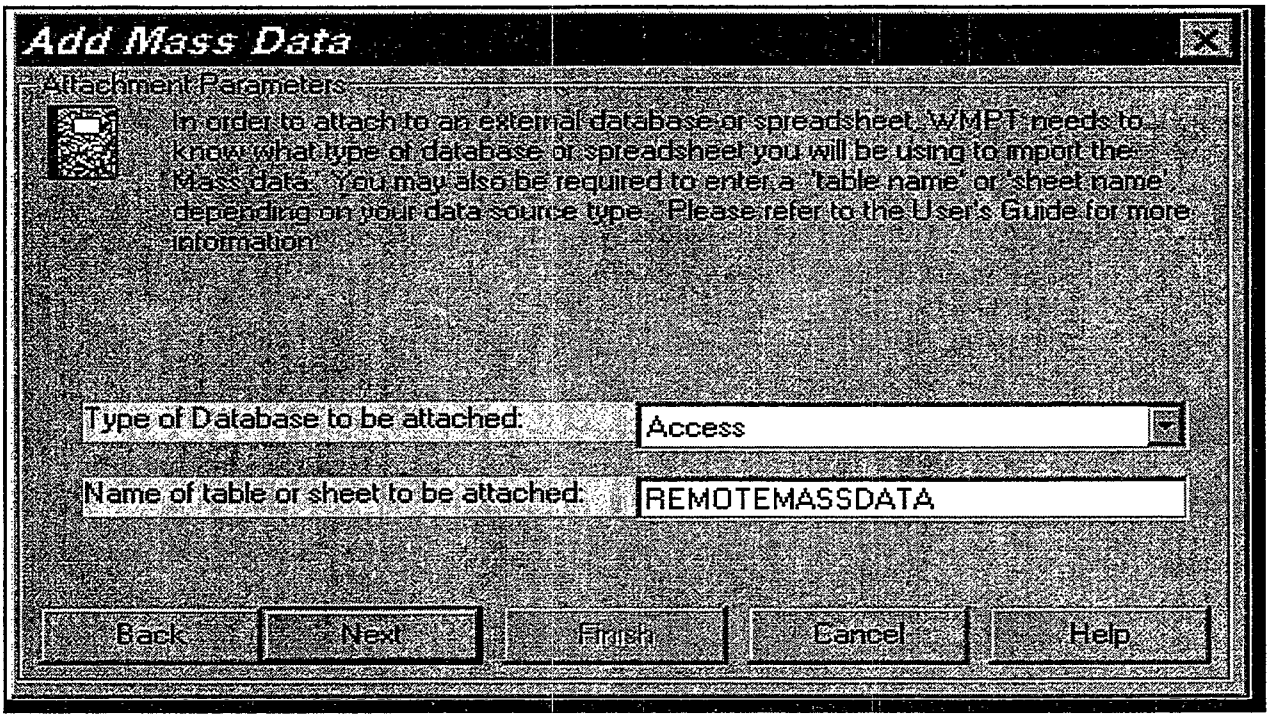
After naming the mass data, click on NEXT to advance to the next step. NOTE: You must enter a mass data name before advancing to the next step. To go back to the addition option selection screen, click on BACK. Click on CANCEL to exit the *Add Mass Data* procedure.

Attaching to An External Source Step 2 - Defining Attachment Parameters

The *Attachment Parameters* screen is shown in Exhibit 2-8. Select the type of database or spreadsheet to attach to by clicking in the space to the right of *Type of database to be attached:* or clicking on and selecting the appropriate file type. Next, type the name of the table or worksheet to be attached in the space to the right of Name of table or sheet to be attached. If required, enter the data table name or worksheet title.

After selecting the file type and the database table or spreadsheet worksheet table name, click on NEXT to advance to the next step. NOTE: You must enter the name of the table or worksheet before advancing to the next step. To go back to Step 1, *Naming the Attachment File*, click on BACK. Click on CANCEL to exit the *Add Mass Data* procedure.

EXHIBIT 2-8
Attachment Parameters Screen



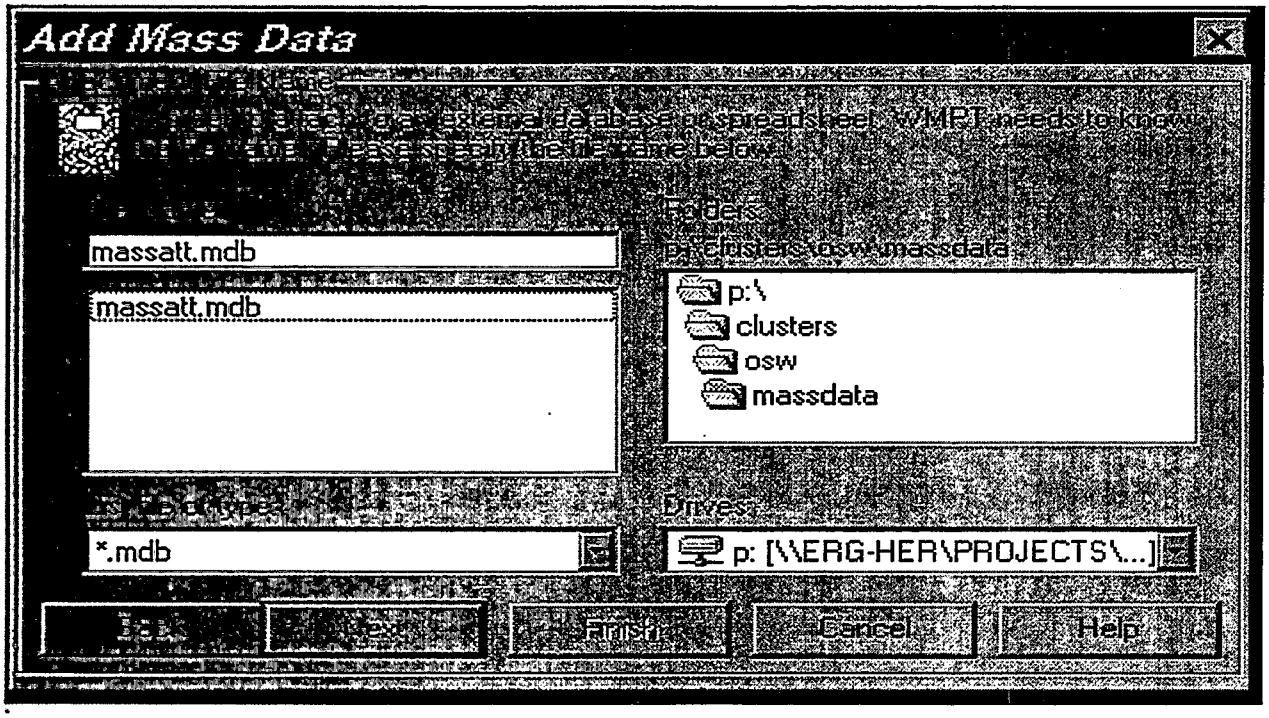
Attaching to An External Source Step 3 - Locating the Attachment File

The *Attachment File Name* screen is shown in Exhibit 2-9. Select the location of the database or spreadsheet file that contains the table or worksheet named in Step 1 by selecting the appropriate drive and folder. A list of file names of the type specified in Step 2 appears below the *File Name* area on the upper left side of the screen. Next, select the database or spreadsheet file by double-clicking on the file name or by clicking once on the file name and clicking on NEXT. NOTE: You must select the name of the database or spreadsheet before advancing to the next step.

You can view all files contained in the selected location by clicking once in the space below the *List File of Type* area in the lower left side of the screen and selecting "*.*" from the drop-down menu. This space contains the file extension of the type specified in Step 2 by default. You may also click on the to the right of the space to display the list.

After selecting the database or spreadsheet by clicking once on the file name and clicking on NEXT or double-clicking on the file name, you will be advanced to the Step 4. To go back to Step 2, *Defining Attachment Parameters*, click on BACK. Click on CANCEL to exit the *Add Mass Data* procedure.

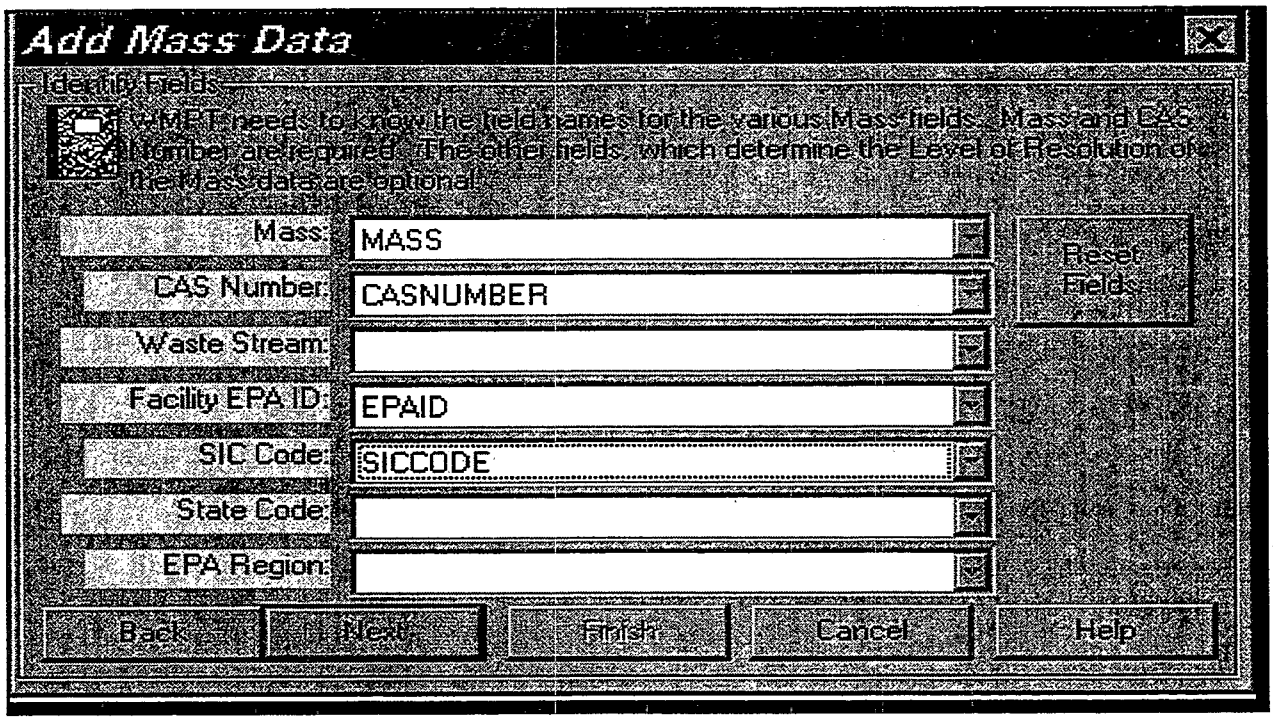
EXHIBIT 2-9
Attachment File Name Screen



Attaching to an External Source Step 4 - Identifying Mass Data Field Names

The *Identify Fields* screen is shown in Exhibit 2-10. Identify the field names contained in the external data table or spreadsheet for each mass data element by clicking on the empty box to the right of each data element name. A drop-down list of all available field names appears. You can also activate the drop-down list by clicking on the ▼ to the right of the box. The external data source must contain specific column or field names and formats so that WMPT can recognize the data that is contained in the source. Exhibit 2-6 contains the required field names and formats for the external data source. Select the appropriate field name by clicking on it. The drop-down list will disappear and the field name will appear in the box. NOTE: You MUST identify field names for the mass and CAS number data elements. The remaining data elements are optional. The WMPT will only recognize those data elements that are identified with a data table or spreadsheet field name.

EXHIBIT 2-10
Identify Fields Screen



You can automatically clear all of the field names identified for the mass data elements by clicking on RESET. After all of the appropriate field names are identified, click on NEXT to advance to Step 5. NOTE: You must identify at least the mass and CAS number data element fields before advancing to the next step. To go back to Step 3, *Locating the Attachment File*, click on BACK. Click on CANCEL to exit the *Add Mass Data* procedure.

Attaching to An External Source Step 5 - Confirming the Attachment

Review the information contained in the *Confirmation* screen shown in Exhibit 2-11 to verify that the correct mass data is selected to be attached. The following information are numbered and displayed in the *Confirmation* screen:

1. How will mass data be obtained - lists the selected mass data incorporation option (e.g., Attach to an existing database or spreadsheet).

2. Selected Level of Data Resolution - lists the following levels of data resolution potentially contained in the attached database:
   a. EPA Region ID;
   b. State Code;
   c. SIC Code;
   d. Facility EPA ID;
   e. Waste Stream ID; and
   f. Chemical CAS Number.

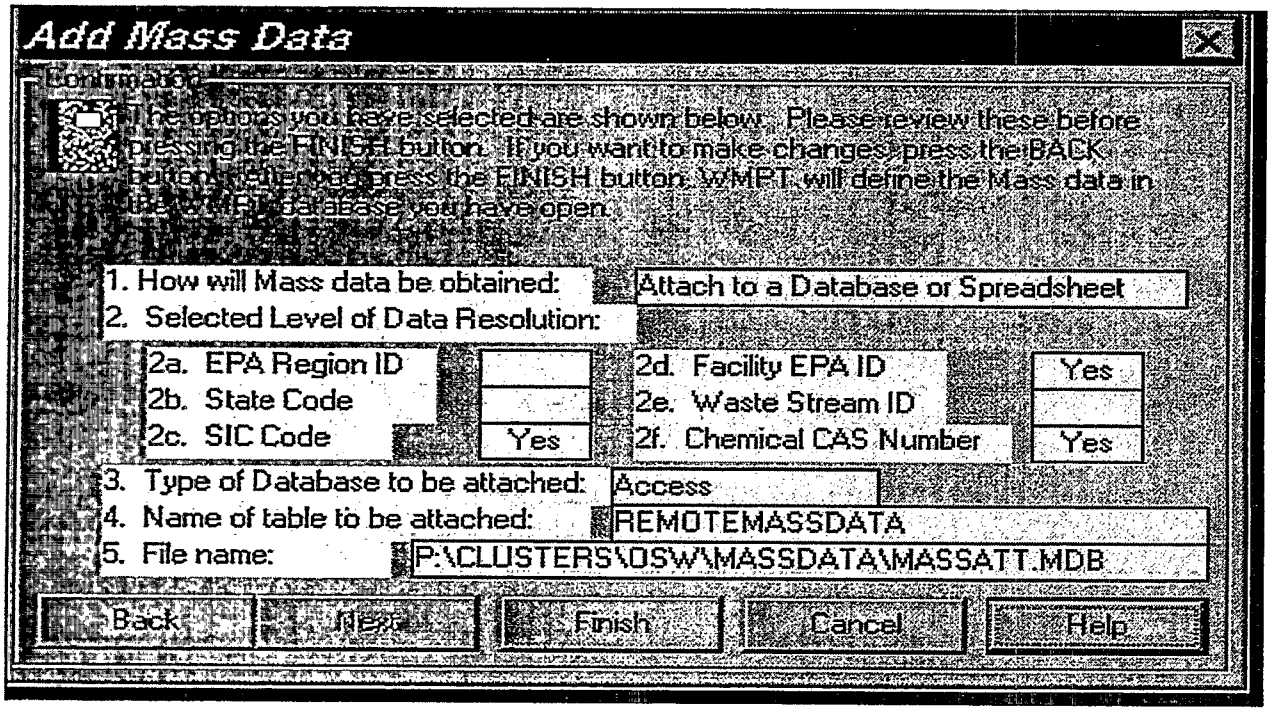
   Each one of the resolution levels is labeled with a "Yes" or "No," corresponding to the data contained in the attached database or spreadsheet.

3. Type of database to be attached - lists the database or spreadsheet file type selected in Step 2, *Defining Attachment Parameters.*

4. Name of table to be attached - lists the name of the data table or worksheet selected in Step 2, *Defining Attachment Parameters.*

5. File name - lists the name and location of the database or spreadsheet selected in Step 3, *Locating the Attachment File.*

EXHIBIT 2-11
Confirmation Screen



If any of the information is incorrect, you can return to the previous steps by clicking on BACK and repeating the process. Click on CANCEL to exit the *Add Mass Data* procedure without attaching to the selected database or spreadsheet..

If all of the information listed on the *Confirmation* screen is correct, click on FINISH to attach to the selected database or spreadsheet. The *Mass Data - Modify* screen appears, displaying the mass data that is contained in the attached data source. The *Mass Data - Modify* screen and its functions are discussed in detail in Section 2.3.4, *Editing Mass Data.*

Importing a CSV File

A *.CSV file is a comma-separated-value file. This type of file can be created in most database and spreadsheet applications by saving an existing database or spreadsheet as a *.CSV file. If the mass data is contained within a *.CSV file, WMPT allows you to create a data table in the system and import the mass data into that table. Before importing the data, you must know the location and name of the *.CSV file. **NOTE: The *.CSV file must contain specific column or field names and formats so that**

WMPT can recognize the data that is contained in the file. Exhibit 2-12 contains the required field names and formats for the external database table or spreadsheet.

EXHIBIT 2-12
External Mass Data Required Field/Column Names and Formats

Mass Data Element	Required Field/Column Name	Required Field/Column Format
Mass Data Record Number*	MASSID	Numeric Long (1 - 2,147,483,647)
Mass Amount*	MASS	Numeric Single
Chemical CAS Number*	CASNUMBER	Numeric Long
Waste Stream Identifier	WASTESTREAM	Numeric Integer (0 - 255)
EPA Facility Code	EPAID	Text (12 characters)
SIC Code	SICCODE	Numeric Integer
State Code (e.g., AZ)	STATE	Text (2 characters)
EPA Region Number	REGION	Numeric Integer

The steps for importing a *.CSV file are listed below:

Step 1 - Naming the Import File;

Step 2 - Identifying the Level of Data Resolution;

Step 3 - Locating the Imported File; and

Step 4 - Confirming the Import.

*Importing a *.CSV File Step 1 - Naming the Import File*

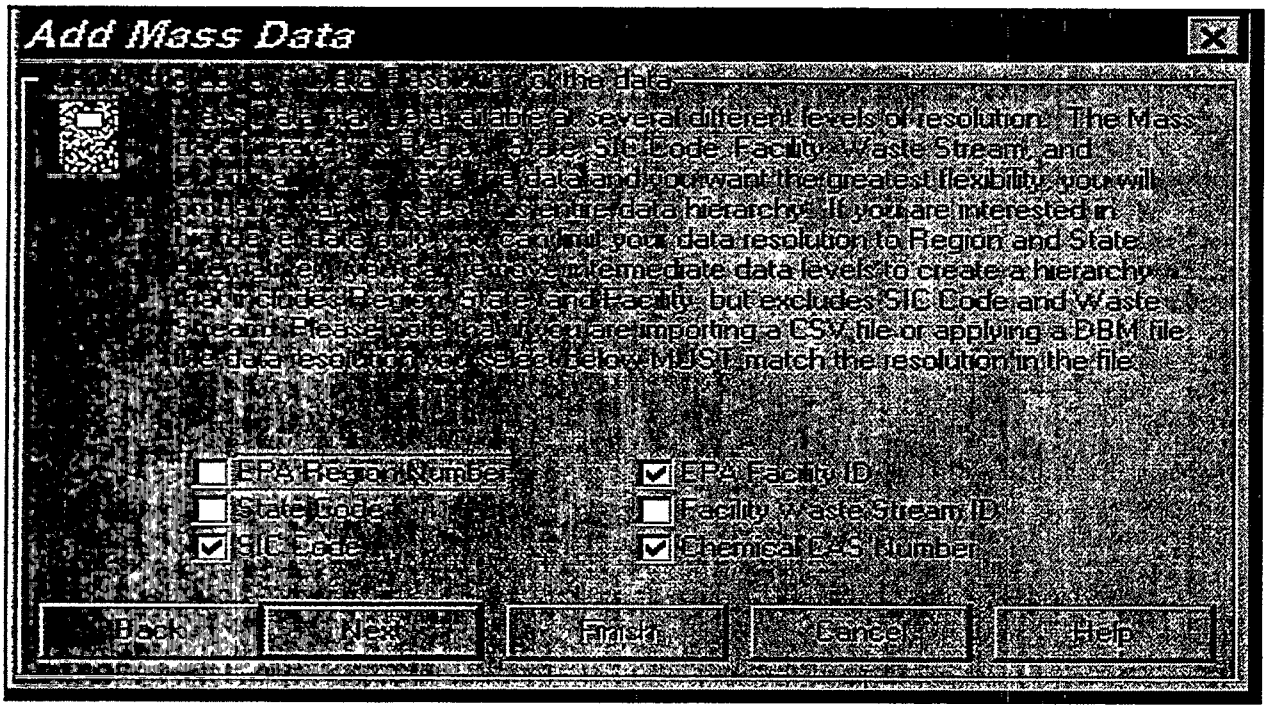
The *Name and Description* screen is shown in Exhibit 2-7. Create a name for the import file that the WMPT will use to identify the mass data table when switching from one set of mass data to another (see Section 2.2.6, *Switching to Another Mass Data Table*) by clicking on the space to the right of *Name:* and entering a mass data name. As an option, you can also enter a description of the mass data in the space below *Description* by clicking and entering in the description.

After naming the mass data, click on NEXT to advance to the next step. NOTE: You must enter a mass data name before advancing to the next step. To go back to the addition option selection screen, click on BACK. Click on CANCEL to exit the *Import Mass Data* procedure.

*Importing a *.CSV File Step 2 - Identifying the Level of Data Resolution*

The *Identify the Level of Data Resolution* screen is shown in Exhibit 2-13. Select the desired data resolution (i.e., level of detail) of the mass data to be imported by clicking on each box located to the right of the resolution level at the bottom of the screen. A "✓" will appear in the box when the level is selected. You can select any of the optional data resolution levels, even if they are not currently contained in the *.CSV file. The WMPT will create fields in the mass data table in which you can enter the missing data manually (refer to Section 2.5.2 for more detail on editing mass data). Optional resolution levels include: Wastestream Identifiers, EPA Facility Codes, SIC Codes, State Codes, and EPA Region Numbers. The *.CSV file MUST contain Mass Data Record Numbers, Mass Amounts, and CAS Numbers in order to be successfully imported. The *.CSV file must also contain the required field names and formats listed in Exhibit 2-12.

EXHIBIT 2-13
Identify the Level of Data Resolution Screen



After selecting the desired data resolution for the mass data, click on NEXT to advance to the next step. NOTE: You must select at least the CAS Number resolution level before advancing to the next step. To go back to the addition option selection screen, click on BACK. Click on CANCEL to exit the *Import Mass Data* procedure.

*Importing a *.CSV File Step 3 - Locating the Imported File*

Select the location of the *.CSV that contains the mass data to be imported by selecting the appropriate drive and folder. A list of *.CSV file names appears below the *File Name* area on the upper left side of the screen. Next, select the file by double-clicking on the file name or by clicking once on the file name and clicking on NEXT. NOTE: You must select a *.CSV file before advancing to the next step.

You can view all files contained in the selected location by clicking once in the space below the *List File of Type* area in the lower left side of the screen and selecting "*.*" from the drop-down menu.

This space contains the file extension of the type specified in Step 1 by default. You may also click on the  to the right of the space to display the list.

After selecting the *.CSV file by clicking once on the file name and clicking on NEXT or double-clicking on the file name, you will be advanced to the Step 3. To go back to Step 1, *Naming the Import File*, click on BACK. Click on CANCEL to exit the *Import Mass Data* procedure.

*Importing a *.CSV File Step 4 - Confirming the Import*

Review the information contained in the *Confirmation* screen shown in Exhibit 2-11 to verify that the correct mass data is selected to be imported. The following information are numbered and displayed in the *Confirmation* screen:

1. How will mass data be obtained - lists the selected mass data incorporation option (e.g. Import a *.CSV file).

2. Selected Level of Data Resolution - lists the following levels of data resolution potentially contained in the imported file:
   a. EPA Region ID;
   b. State Code;
   c. SIC Code;
   d. Facility EPA ID;
   e. Waste Stream ID; and
   f. Chemical CAS Number.

   Each one of the resolution levels is labeled with a "Yes" or "No," corresponding to the selections made in Step 2. NOTE: The *.CSV file must contain the field/column names and formats specified in Exhibit 2-12 in order for WMPT to import data contained in each of the resolution levels.

3. Type of database to be attached - Not applicable for *.CSV imports.

4. Name of table to be attached - Not applicable for *.CSV imports.

5. File name - lists the name and location of the *.CSV file selected in Step 3, *Locating the Imported File*

If any of the information is incorrect, you can return to the previous steps by clicking on BACK and repeating the process. Click on CANCEL to exit the *Import Mass Data* procedure without importing the *.CSV mass data.

If all of the information listed on the *Confirmation* screen is correct, click on FINISH to import the selected *.CSV file mass data. A confirmation screen appears indicating the number of mass records that were imported. Click on OK. The *Mass Data - Modify* screen appears, displaying the mass data that was imported from the *.CSV file. The *Mass Data - Modify* screen and its functions are discussed in detail in Section 2.3.4, *Editing Mass Data.*

Manually Entering In Data

You can manually enter mass data into the WMPT. The system will create a blank data table that contains the necessary fields according to a selected level of data resolution. The steps for creating the mass data table are listed below:

Step 1 - Naming the Mass Data Table;

Step 2 - Identifying the Level of Data Resolution; and

Step 3 - Confirming the Mass Data Table.

Creating a Mass Data Table Step 1 - Naming the Mass Data Table

The *Name and Description* screen is shown in Exhibit 2-7. Create a name for the mass data table that the WMPT will use to identify the table when switching from one set of mass data to another (see Section 2.2.6, *Switching to Another Mass Data Table*) by clicking on the space to the right of *Name:* and entering a mass data name. As an option, you can also enter a description of the mass data in the space below *Description* by clicking and entering in the description.

After naming the mass data, click on NEXT to advance to the next step. NOTE: You must enter a mass data name before advancing to the next step. To go back to the addition option selection screen, click on BACK. Click on CANCEL to exit the *Create Mass Data Table* procedure.

Creating a Mass Data Table Step 2 - Identifying the Level of Data Resolution

The *Identify Level of Data Resolution* screen is shown in Exhibit 2-13. Select the desired data resolution (i.e., level of detail) of the mass data to be manually entered by clicking on each box located to the right of the resolution level at the bottom of the screen. A "✓" will appear in the box when the level is selected. The WMPT will create fields in the mass data table in which you can enter the data manually (refer to Section 2.3.4 for more detail on editing mass data). You must select CAS Number as a minimum level of data resolution. Optional resolution levels include Wastestream Identifiers, EPA Facility Codes, SIC Codes, State Codes, and EPA Region Numbers.

After selecting the desired resolution for the mass data, click on NEXT to advance to the next step. NOTE: You must select at least the CAS Number data resolution level before advancing to the next step. To go back to the addition option selection screen, click on BACK. Click on CANCEL to exit the *Create Mass Data Table* procedure.

Creating a Mass Data Table Step 3 - Confirming the Mass Data Table

Review the information contained in the *Confirmation* screen shown in Exhibit 2-11 to verify that the mass data table is created according to the desired specifications. The following information are numbered and displayed in the *Confirmation* screen:

1. How will mass data be obtained - lists the selected mass data incorporation option (e.g. Manual Key Entry).

2. Selected Level of Data Resolution - lists the following levels of data resolution potentially contained in the mass data table:
   a. EPA Region ID;
   b. State Code;
   c. SIC Code;
   d. Facility EPA ID;
   e. Waste Stream ID; and
   f. Chemical CAS Number.

   Each one of the resolution levels is labeled with a "Yes" or "No," corresponding to the selections made in Step 2.

3. Type of database to be attached - Not applicable for mass data table creation.

4. Name of table to be attached - Not applicable for mass data table creation.

5. File name - Not applicable for mass data table creation.

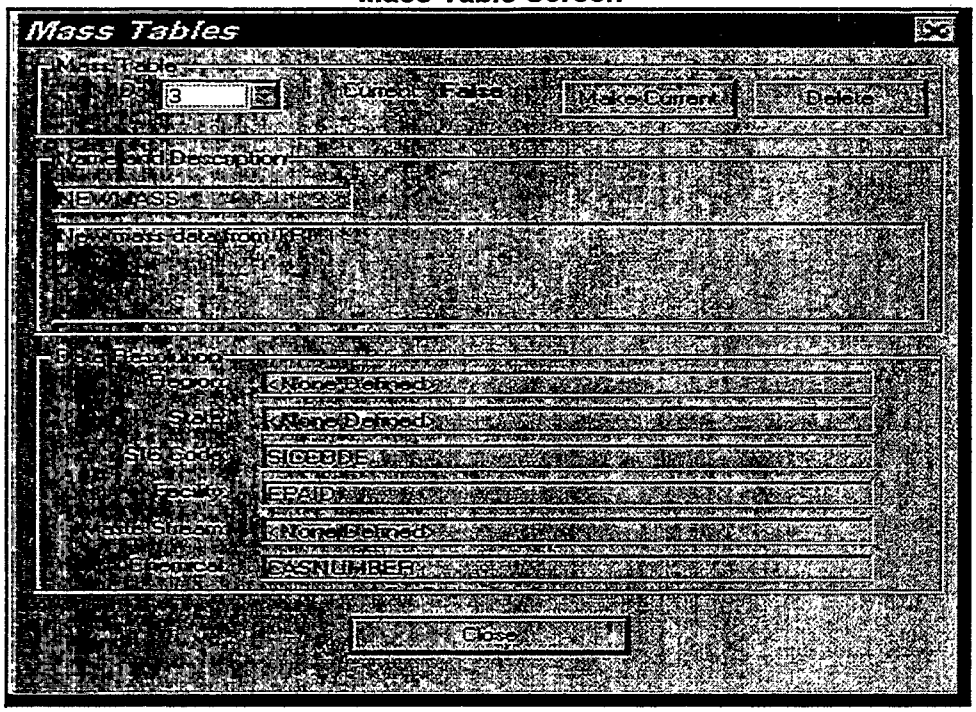
If any of the information is incorrect, you can return to the previous steps by clicking on BACK and repeating the process. Click on CANCEL to exit the *Create Mass Data Table* procedure without creating the mass data table.

If all of the information listed on the *Confirmation* screen is correct, click on FINISH to create the mass data table. The *Mass Data - Modify* screen appears, displaying an empty mass data table that was created in the system. The *Mass Data - Modify* screen and its functions are discussed in detail in Section 2.3.4, *Editing Mass Data.*

2.2.6 Switch to Another Mass Data Table

You can switch from one attached, imported, or manually-entered mass data table to another by selecting *Switch Mass Tables* from the **File** menu. The *Mass Tables* screen shown in Exhibit 2-14 appears and displays information on the currently active mass data table. The name of the currently active mass data table is always displayed on the WMPT main title bar following the open database name (e.g., CHEMICAL.MDB/SAMPLE). The *Mass Table* area at the top of the *Mass Table* screen contains the current mass data ID number as well as the status for the data table. The currently active data table is listed with "True" to the right of *Current:* in the *Mass Table* area. The *Name and Description* area just below the *Mass Table* area contains the name and any descriptive text that was entered in Step 1 of the *Add Mass Data* procedures described in Section 2.5.1. At the bottom of the *Mass Table* screen is the *Data Resolution* area. In this area the possible levels of mass data resolution are listed. To the right of each level is either the mass data field name or "<None Defined>" if there was no field name identified for that resolution level in the *Add Mass Data* procedure.

EXHIBIT 2-14
Mass Table Screen



To switch from the active mass data table to another attached, imported, or manually entered mass data table, click on the box or the ▼ located to the right of *ID:* to activate the drop-down list of available mass data table ID numbers. Select an ID number by clicking on it. The number will appear in the box and the drop-down list will disappear. The information for the selected mass data ID number is displayed in the *Name and Description* and *Data Resolution* areas. To make the selected mass data the active mass data in the WMPT, click on MAKE CURRENT located in the *Mass Table* area. The *Current:* status changes from "False" to "True" and a confirmation screen appears. Click on OK to close this screen.

To delete an attached, imported, or manually-entered mass data table, select an inactive mass ID number and then click DELETE located in the *Mass Tables* area to the right of MAKE CURRENT. NOTE: Both the MAKE CURRENT and DELETE buttons are not functional until an inactive mass data ID number is selected. Click on CLOSE to exit the *Mass Tables* screen.

2.2.7 Exit from WMPT

To exit WMPT, select *Exit* from the **File** menu. This will exit the WMPT and return you to your operating system. If any changes have been made to WMPT database, you will be prompted to save changes, cancel, or exit WMPT without saving any changes.

2.3 EDITING DATA (EDIT MENU)

This section describes how to use the WMPT **Edit** menu to add chemicals, add or revise chemical data, and add or revise fencelines. The **Edit** menu contains the commands listed in Exhibit 2-15.

EXHIBIT 2-15
Edit Menu Commands

Command	Description
Chemical Data	Edit chemical data by CAS number, chemical name, chemical list, or RCRA code.
Fencelines	Edit factor scoring fencelines.
Chemical Synonyms	Edit available chemical synonyms.
Mass Data	Edit mass data detail or mass data summary.
Chemical Lists	Edit or create new chemical lists.

Each of the **Edit** menu commands are discussed in detail in the following subsections.

2.3.1 Editing Chemical Data

Selecting Chemicals to be Edited

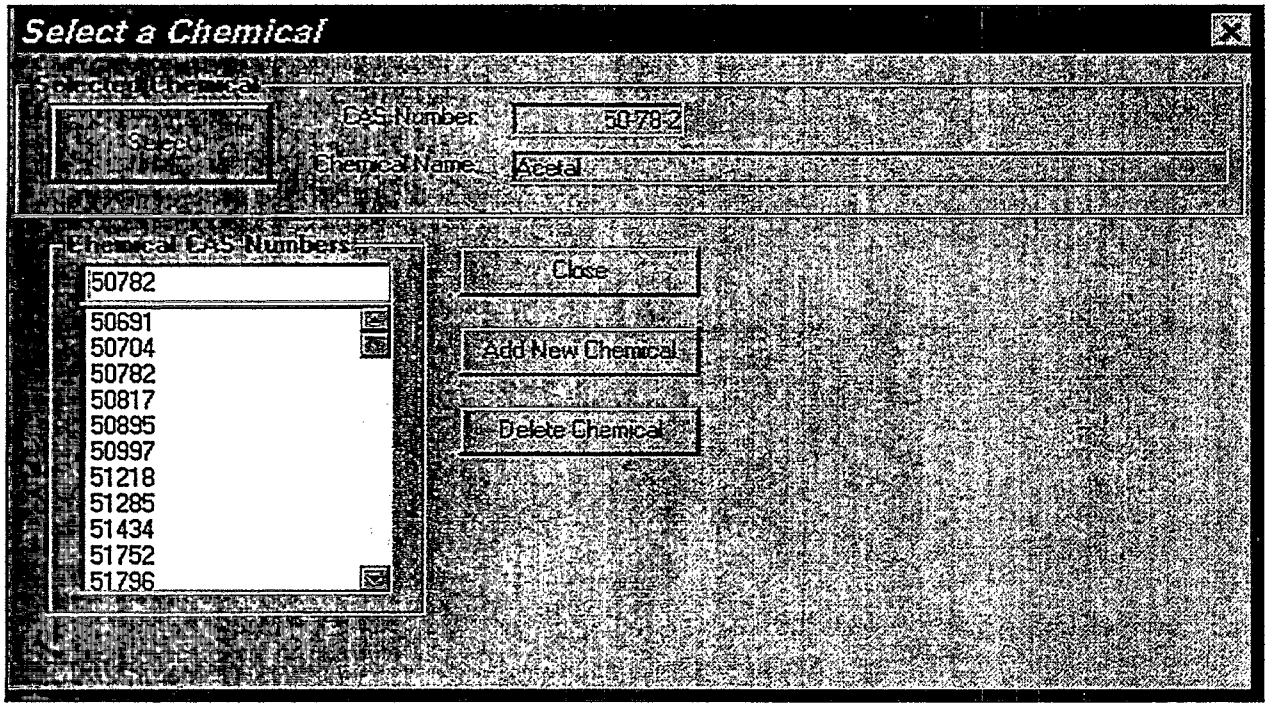
You can edit WMPT chemical data by selecting *Chemicals* from the **Edit** menu. Select chemical(s) to edit by clicking on one of the following secondary menus:

- *Select By CAS Number*;
- *Select By Chemical Name*;
- *Select A Chemical List*; and
- *Select By RCRA Code.*

Select a chemical to edit using a CAS number by choosing *Select By CAS Number.* The *Select a Chemical* screen shown in Exhibit 2-16 will appear. Notice the screen contains two parts, *Selected Chemical* and *Chemical CAS Numbers.* You can choose a specific chemical to edit by typing the CAS number in the space provided in the *Chemical CAS Numbers* area. As you type in the CAS number, the list of available WMPT CAS numbers appears. Select the desired CAS number from the list when it appears by clicking on it once. Alternatively, you can use the scroll bar located to the right of the list to move up and down through the list of CAS numbers. Click on to move up one line or click on the shaded area just below the to page up. Click on to move down one line or click on the shaded area just above the to page down. After you select a CAS number, both the CAS number and the corresponding chemical name appear in the *Selected Chemical* area.

Select a chemical to edit using chemical names by choosing *Select By Chemical Name.* The *Select a Chemical* screen will appear. For the *Select by Chemical Name*, the screen shown in Exhibit 2-16 appears with chemical names in the lower half of the screen rather than CAS numbers. You can choose a specific chemical to edit by typing the chemical name in the space provided in the *Chemicals in Database* area. As you type in the chemical name, the list of available WMPT chemical names appears. Select the desired chemical name from the list when it appears by clicking on it once. Alternatively, you can use the scroll bar located to the right of the list to move up and down through the list of chemical names. Click on to move up one line or click on the shaded area just below the to page up. Click on to move down one line or click on the shaded area just above the to page down. After you select a chemical name, both the chemical name and corresponding CAS number appear in the *Selected Chemical* area.

EXHIBIT 2-16
Select a Chemical Screen
(Select by CAS Number Option)



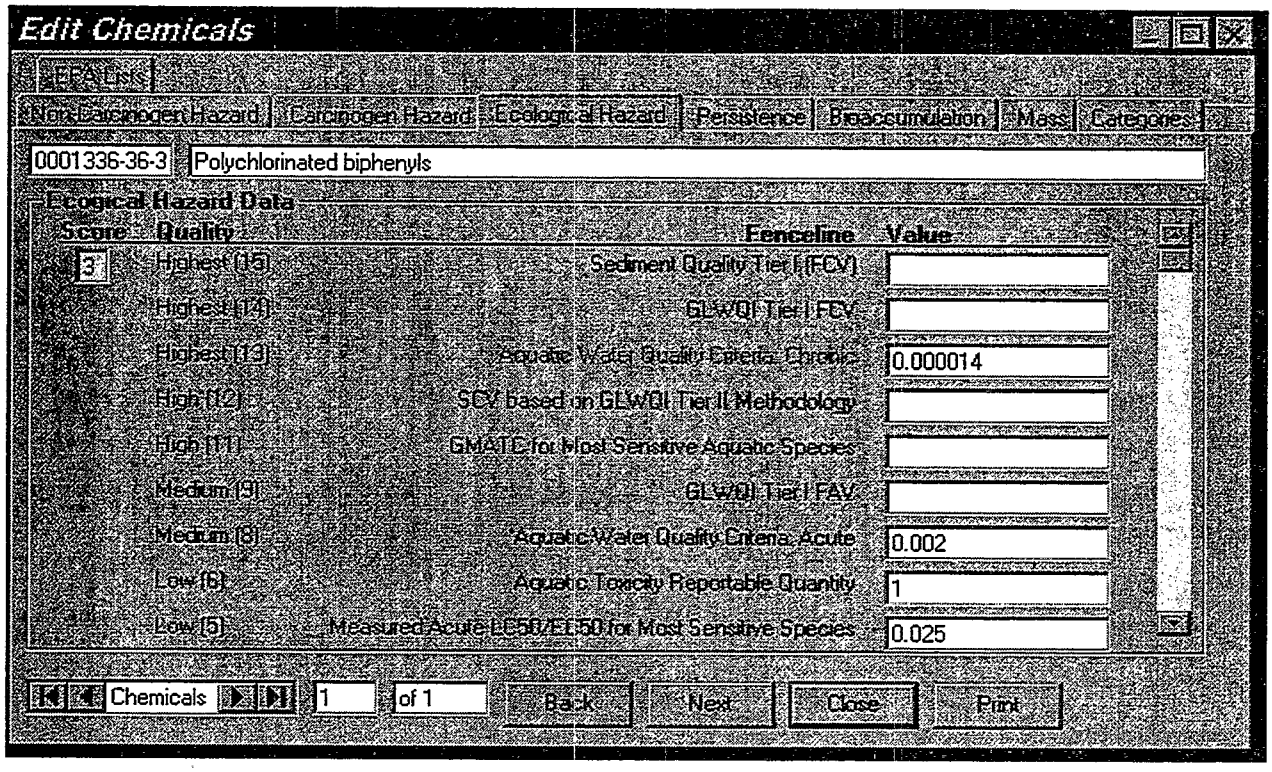
Edit all chemicals contained in a WMPT chemical list by choosing *Select A Chemical List*. The *Select a List of Chemicals* screen will appear with a list of all WMPT chemical lists. You can use the scroll bar located to the right of the list to move up and down through the available chemical lists. Click on ▲ to move up one line or click on the shaded area just below the ▲ to page up. Click on ▼ to move down one line or click on the shaded area just above the ▼ to page down. Select a list of chemicals by clicking on the desired list name. After you select a chemical list, the list name appears at the top of the screen. For a more detailed description on how to create a WMPT chemical list, see *Defining Chemical Lists*, Section 2.3.5.

Edit all chemicals associated with a specific RCRA code by choosing *Select By RCRA Code*. The *Select Chemicals by RCRA Code* screen will appear with a list of all WMPT RCRA codes and RCRA code descriptions. You can use the scroll bar to the right of the list to move up and down through the list of RCRA codes. Click on ▲ to move up one line or click on the shaded area just below the ▲ to page up. Click on ▼ to move down one line or click on the shaded area just above the ▼ to page down. Select a RCRA code by clicking on the desired code.

Editing Selected Chemicals

After you choose a chemical or group of chemicals to edit, click on SELECT. The *Edit Chemicals* screen shown in Exhibit 2-17 will appear with the CAS number and the name of the currently selected chemical at the top of the screen. Tabs labeled for each of the WMPT scoring elements and several other elements are also located at top of the screen. You can maneuver between the tabs by clicking on the specific tab or by clicking on NEXT and BACK located at the bottom of the *Edit Chemicals* screen.

EXHIBIT 2-17
Edit Chemicals Screen



Each *Edit Chemicals* tab contains all WMPT fenceline data elements used to calculate the associated tab subscore. The subscore is displayed in the upper left side of the screen beneath the selected CAS number and chemical name. To the right of the subscore is the data element relative quality, the fenceline data element name, and the data element value for the selected chemical. To edit the data element, click in the desired data element value box and type in the new value. Note: You cannot edit pre-scored WMPT data elements and scores. These elements appear within a gray box and WMPT will not allow you to change the value.

Note that red text is used to indicate the factors driving the tab subscore. For example, if log P is displayed in red on the Bioaccumulation tab, the log P value for the selected chemical results in the highest concern bioaccumulation score.

If you choose to edit data for a group of chemicals, the total number of chemicals in the group is listed at the bottom left corner of the *Edit Chemicals* screen along with the number of the current chemical displayed, for example, "1 of 69." To advance the display to the next chemical in the group, click on ▶ located to the right of the word "Chemical" at the bottom left of the screen. To go back to a chemical within the group, click on the ◀ to the left of the word "Chemical." The currently displayed number will change as you click on the left and right arrows. You can select either the first or the last chemical in the group by clicking on ⏮ or ⏭, respectively.

You can print the information on each of the tabs accessed using *View Chemicals* by clicking on PRINT.

Note that after exiting and re-entering the *Edit Chemicals* screen, once a change has been made in the chemical data for a chemical, a red warning notice appears, indicating that the chemical data for the

selected chemical has been changed since the last scoring. This notice appears on all chemical data edit and view screens until you rescore the WMPT.

Adding and Deleting Chemicals

You can add or delete a WMPT chemical by choosing either *Select by CAS Number* or *Select by Chemical Name* from the **Edit,** *Chemicals* menu. The *Select a Chemical* screen shown in Exhibit 2-16 appears. To add a chemical, click on ADD NEW CHEMICAL located to the right of the list. Enter the CAS number and name of the chemical and click OK. You also are provided with the option to enter a chemical name without a CAS number and having the system generate a CAS number for you. You will be returned to the *Select a Chemical* screen, where you can select the newly added chemical and enter values for WMPT data elements. To delete a chemical from the WMPT, select the chemical to be deleted from the chemical list on the *Select a Chemical* screen and click on DELETE CHEMICAL.

After you complete chemical editing, click on CLOSE. You will be returned to the *Select a Chemical, Select a List of Chemicals,* or *Select By RCRA Code* screen. You may select another chemical or group of chemicals to edit by repeating the process described above. If you are finished, click on CLOSE again to return to the WMPT main menu. It is recommended that you save your database at this time by selecting *Save* from the **File** menu or by clicking on the toolbar save icon.

2.3.2 Editing Fencelines (Thresholds)

You can edit the fencelines (threshold values) used by the WMPT to calculate the various subscores for each chemical by selecting *Fencelines* from the **Edit** menu. The *Edit Fencelines* screen shown in Exhibit 2-18 will appear. The *Edit Fencelines* screen is divided into five areas: *Select a Component, Select a Factor, Quality of the Data, Factor Scoring, and Method to be Used in Scoring.* You can edit WMPT scoring methodology and/or the fencelines applied to each data element contained by a scoring component by choosing different selections from each portion of the *Edit Fencelines* screen as described below. Some data elements have fenceline values that are calculated by WMPT. These prescored fencelines cannot be edited. All fenceline editing features are disabled for prescored data elements.

Select a Component

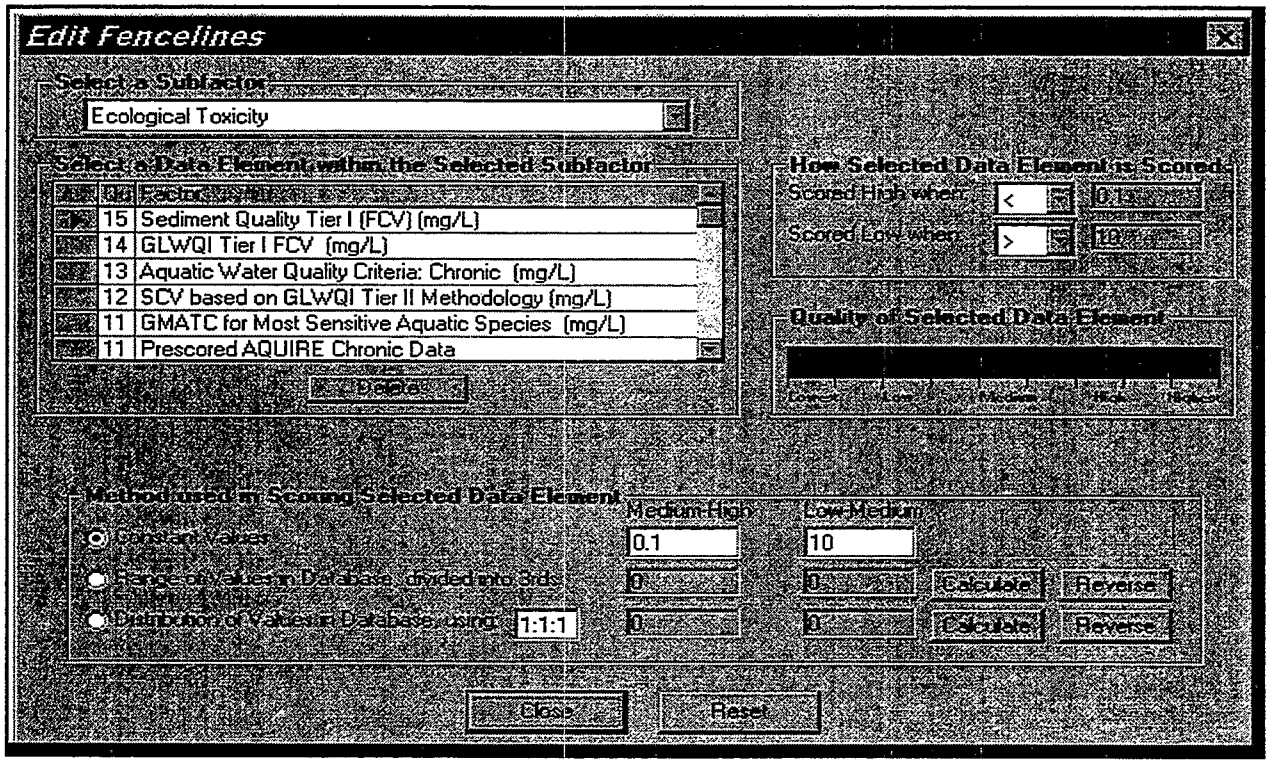
View the list of WMPT scoring components available for editing by clicking on the down arrow to the right of the scoring component box in the *Select a Component* area. For example, Ecological Hazard is a scoring component. Select a component to edit by clicking on the component name.

Select a Factor

Select a factor or data element to edit by clicking on the desired factor name in the *Select a Factor* area of the screen. For example, if you would like to edit the fencelines applied to the Sediment Quality Tier I (FCV) data in the Ecological Hazard subscore, click on "Sediment Quality Tier I (FCV)" in the *Select a Factor* area.

You can also choose to delete a factor used in component scoring by clicking on DELETE at the bottom of the *Select a Factor* area.

EXHIBIT 2-18
Edit Fencelines Screen



Quality of Data

After selecting a factor, the relative data quality assigned to that factor is displayed graphically on the thermometer bar labeled with data quality tick marks. This thermometer bar is located in the *Quality of the Data* area of the *Edit Fencelines* screen. You can edit the data quality assigned to a factor by clicking in the thermometer bar until the filled level corresponds to the desired data quality tick mark. For example, if you would like to adjust the data quality assigned to the Sediment Quality Tier I (FCV) data in the Ecological Hazard subscore to "Medium," you would click in the area to the left of the thermometer filled level until it reaches the tick mark labeled "Medium."

Factor Scoring

You can redefine how the WMPT calculates a "High," "Medium," or "Low" score for each factor by editing the operands in the *Factor Scoring* area. A factor is assigned a relative score of "High" when the value for a selected factor meets the criteria assigned by the operand and value displayed to the right of "Scored High When." A factor is assigned a relative score of "Low" when the value for a selected factor meets the criteria assigned by the operand and value displayed to the right of "Scored Low When." A factor is assigned a relative score of "Medium" when the value for a selected factor falls between the "Scored High When" and "Scored Low When" criteria.

You can edit factor scoring by modifying the operands in the *Factor Scoring* area. To view the list of available operands, click on next to the displayed operand. Available operands include greater than, less than, equal to, greater than or equal to, less than or equal to, and not equal to. Select an operand by clicking on the desired operand from the displayed list.

Fenceline values that are calculated by the WMPT cannot be edited. These values appear in the grey box next to the corresponding operands in the *Factor Scoring* area. You can edit the constant values to which the operands are applied by following the direction described below in the *Method to Be Used in Scoring* section.

Method to be Used in Scoring

You can edit the specific factor fenceline values within the *Method to be Used in Scoring* area, located at the bottom of the *Edit Fencelines* screen. Edit a specific fenceline constant value by selecting *Constant Values* and entering the desired values in the boxes to the right. Alternatively, WMPT will calculate the fenceline values by dividing the data contained in the WMPT database into thirds by selecting *Range of Values in Database, divided into 3rds* or by using a data distribution you input after selecting the *Distribution of Values in Database, using:*. After selecting one of these options to calculate the fencelines, click on CALCULATE located to the right of the *Low-Medium* box for the selected option. To reverse which fenceline is used to define the High-Medium and Low-Medium scores, click on REVERSE located to the right of the CALCULATE button for the selected option.

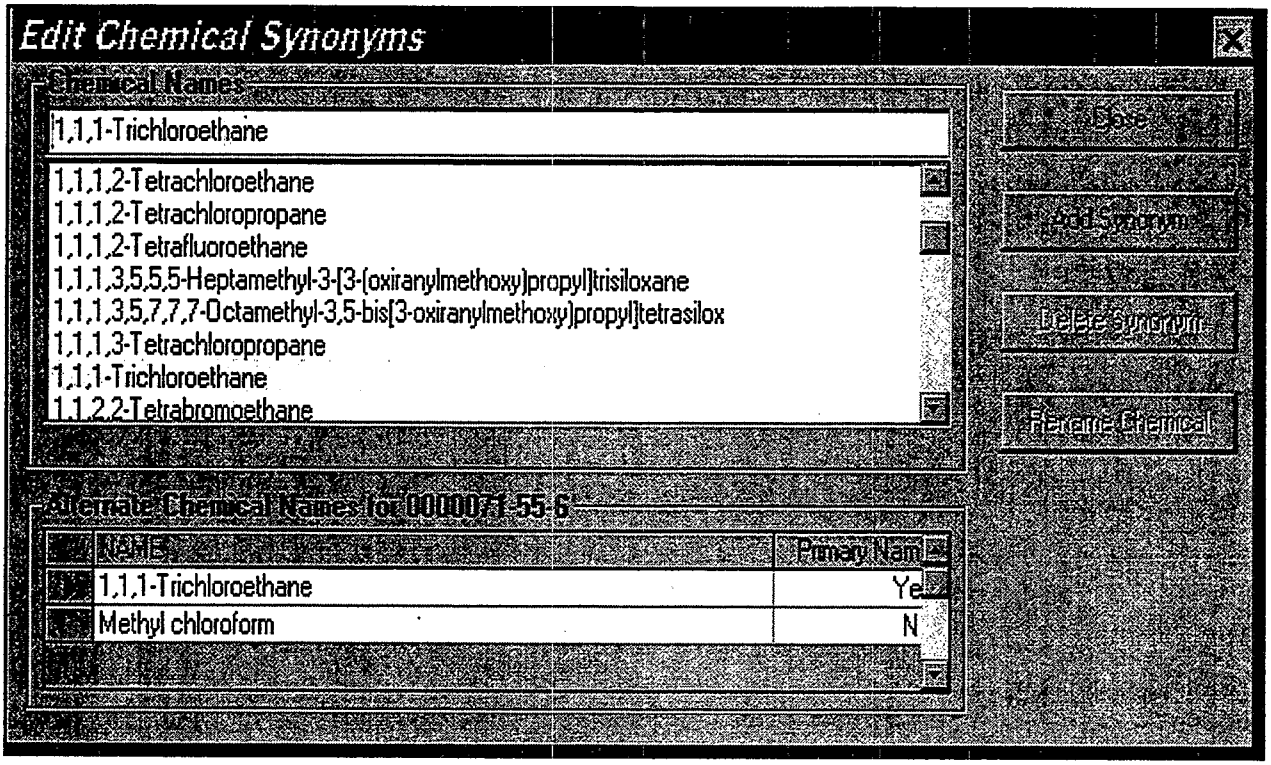
Applying Fenceline Edits

Note that after editing any fenceline values, a warning appears in red indicating that the selected Fenceline has been changed since the last scoring. This warning will appear on all editing and viewing screens until you rescore the WMPT. After you complete all desired fenceline edits, click on CLOSE located at the bottom of the *Edit Fencelines* screen. It is recommended that you rescore and save the database at this time. To rescore the database, follow the instructions located in Section 2.5. Save the database by selecting *Save* from the **File** menu or by clicking on the toolbar save icon.

2.3.3 Editing Chemical Synonyms

Add or delete chemical synonyms or reset the chemical name used by the WMPT by selecting *Chemical Synonyms* from the **Edit** menu. The *Edit Chemical Synonyms* screen shown in Exhibit 2-19 is shown. Notice the screen is divided into two areas: *Chemical Names* and *Alternate Chemical Names for [CAS number]*. Specify the chemical with a synonym you would like to edit by typing the chemical name in the space provided in the *Chemical Names* area. As you type in the name, the list of available WMPT chemical names appears in the area below the box. Select the chemical from the list when it appears by clicking on it once. Alternatively, you can use the scroll bar located to the right of the list to move up and down through the list of chemical names. Click on  to move up one line or click on the shaded area just below the  to page up. Click on  to move down one line or click on the shaded area just above the  to page down. After you select a chemical, synonyms for that chemical are displayed in the *Alternate Chemical Names for [CAS number]* area (the specific CAS number for the selected chemical appears in the area title).

EXHIBIT 2-19
Edit Chemical Synonyms Screen



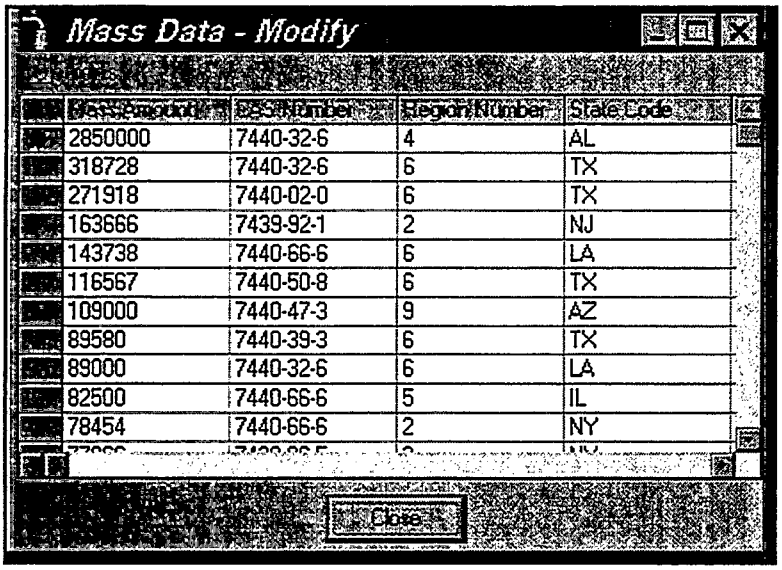
To add a synonym for the selected chemical, click on ADD SYNONYM and enter the new chemical name. To delete a synonym for a selected chemical name, select the synonym to be deleted and click on DELETE SYNONYM. You cannot delete a primary chemical name (i.e., the chemical name that is used by the WMPT). To change the primary name from one synonym to another, select the desired synonym and then click on RENAME CHEMICAL.

After you complete all desired edits to the chemical synonyms, click on the CLOSE. It is recommended that you save the database at this time by selecting *Save* from the **File** menu or by clicking on the toolbar save icon.

2.3.4 Editing Mass Data

You can edit data in the current mass file by selecting Mass Data from the **Edit** menu. After selecting this option, an introductory mass data editing text screen appears. You can choose to not display this introductory screen again by clicking in the box next to "Don't display this screen again." Click OK in the introductory screen to access the *Mass Data - Modify* screen shown in Exhibit 2-20. The mass data shown in Exhibit 2-20 corresponds to that in the current mass data table. You can use the scroll bar located to the right of the data to move up and down through the available data. Use the scroll bar at the bottom of the data to view all columns or fields in the mass data file.

EXHIBIT 2-20
Mass Data - Modify Screen



Edit the data displayed in the *Mass Data - Modify* screen by clicking and highlighting a data item and then entering the revised information using your keyboard. Note that any revisions made using the mass data edit option take effect immediately after entering the change. These edits are PERMANENT. The original data can only be recovered by exiting WMPT without saving any changes.

Printing, Exporting, and Deriving EPA Region

The *Mass Data - Modify* screen includes an **Options** menu that allows you to print the mass data, export the mass data to a CSV file, and derive the EPA region from the state information contained in the mass data. Each of the **Options** menu items is described in more detail in the subsections below.

Print

Send the mass data file directly to a printer by selecting *Print* from the **Options** menu in the *Mass Data - Modify* screen. After selecting print, you are prompted to enter a title that will appear at the top of every page printed. You can also specify the number of copies of the mass table to be printed and select either portrait or landscape page orientation. After completing your selections, click OK to print the mass data table or CANCEL to cancel printing. Note that after selecting OK, the mass data table is sent directly to your default windows printer, no additional printer selections are made nor is the printout sent to a print preview screen.

Export

Export the mass data table to a comma-separated value (CSV) file by selecting *Export* from the **Options** menu in the *Mass Data - Modify* screen. Comma-separated value files can be easily imported into many spreadsheet, database, and word processing applications. Enter a name for the CSV file and specify the destination for the exported file in the space provided. Click OK to export the mass data table as a CSV file to the specified destination or click CANCEL to exit the exporting procedure.

Derive Region

WMPT can populate region information in the current mass data table. To have WMPT populate region information, select *Derive Region* from the **Options** menu of the *Mass Data - Modify* screen. The current mass data table MUST contain state information and MUST contain a region column or field. Click YES and WMPT will populate the region field or column in your mass data table. Click NO to exit the derive region option.

2.3.5 Editing and Creating Chemical Lists

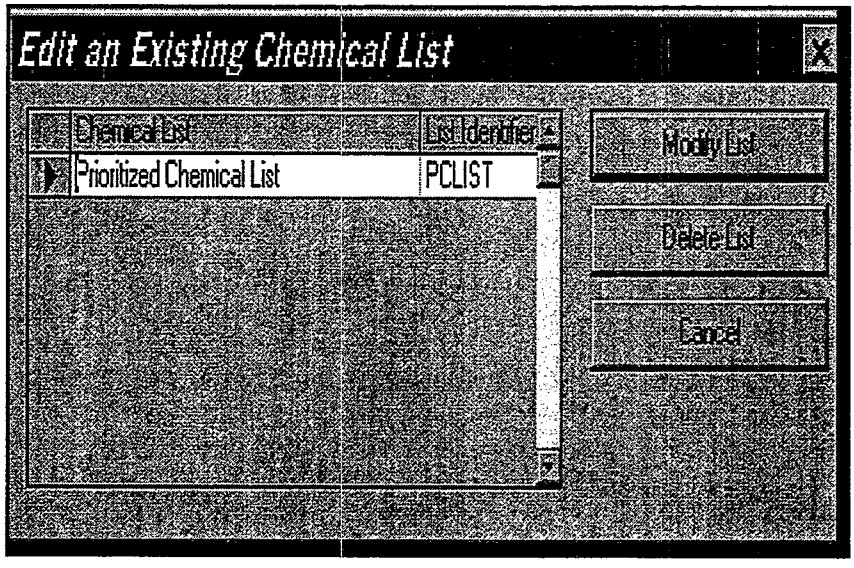
You can edit chemical lists by selecting *Chemical Lists* from the **Edit** menu. Select to edit or create chemical lists by clicking on one of the following secondary menus:

- *Edit Existing Chemical List*; or
- *Create a New Chemical List.*

Edit Existing Chemical List

After selecting *Edit Existing Chemical List* from the *Chemical Lists* menu, the screen shown in Exhibit 2-21 appears. You can now choose to modify an existing list, delete an existing list, or cancel edit chemical list activities.

EXHIBIT 2-21
Edit Existing Chemical List Screen



Modify an existing chemical list by clicking and highlighting the list name and clicking MODIFY LIST. A screen that allows you to sort the display of chemical list members and all other available chemicals by chemical name or CAS number appears. Select either "Sort Chemicals by CAS Number" or "Sort Chemicals by Chemical Name" and click NEXT.

A screen that allows you to optionally filter the selected chemical list to show only those chemicals that meet specified criteria appears. You can filter the list by chemical RCRA Code associations or by another chemical attribute. To view all chemicals available to add to or delete from the chemical list, select "Do Not Filter" and click NEXT. To create a filter, select either "Filter by RCRA Code" or "Filter

by a Chemical Attribute" and click NEXT. Each of these filters are described in more detail in the subsections below.

Filter by a Chemical Attribute

After selecting the option to filter by a chemical attribute, click NEXT. The screen shown in Exhibit 2-22 appears. Apply filtering criteria to select a subset of the WMPT chemicals to be viewed, added, and/or deleted from the selected chemical list. To create filtering criteria, first click in the empty box below *Available Chemical Attributes* to display an alphabetical list of available chemical properties. Select the desired chemical attribute by clicking on it. Next, click in the empty box below *Operator* to display the list of available operators. Select the desired operator by clicking on it, and key enter the value to which the operator will be applied in the empty box below *Compare Value*. For example, to view the list of chemicals with reference dose concentrations less than 1 mg/kg/day, click on the *Operator* box next to the "Reference Dose (RfD), mg/kg/day" field and select the less than (<) operator. Click inside the *Comparison Value* box to the right of the Operator box and type "1."

Click on NEXT to view the WMPT chemicals in the list sorted by either CAS number or chemical name, and filtered according to the criteria defined in this step. The screen shown in Exhibit 2-23 appears and displays the CAS number, chemical name, and a column indicating whether or not each chemical is a member of the selected list. In addition, the screen displays the filtered chemical property data that was selected in the *Chemical List Filtering* screen. This data is displayed in the column titled "Filter."

EXHIBIT 2-22
Chemical List Filtering Screen

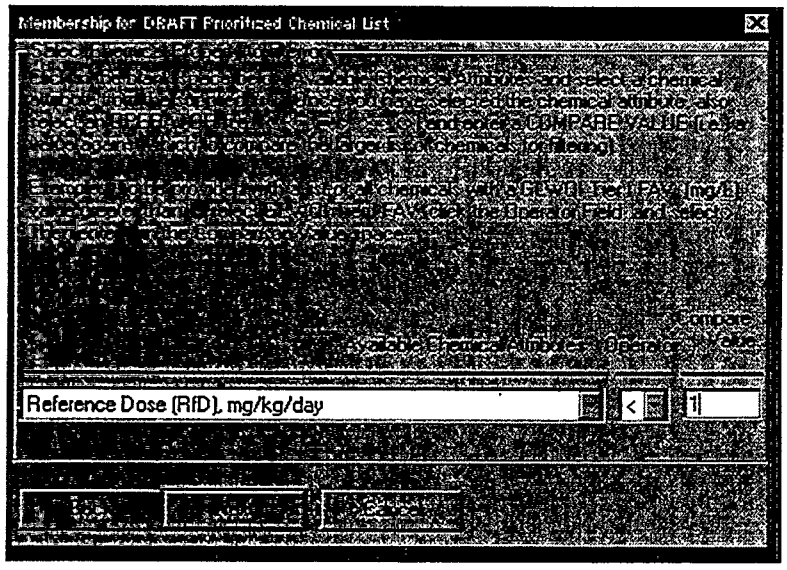
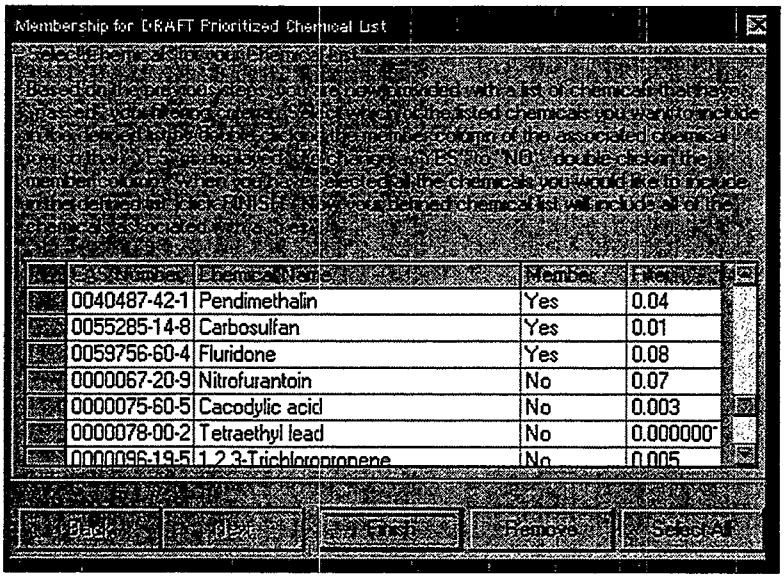


EXHIBIT 2-23
Chemical List Members Screen



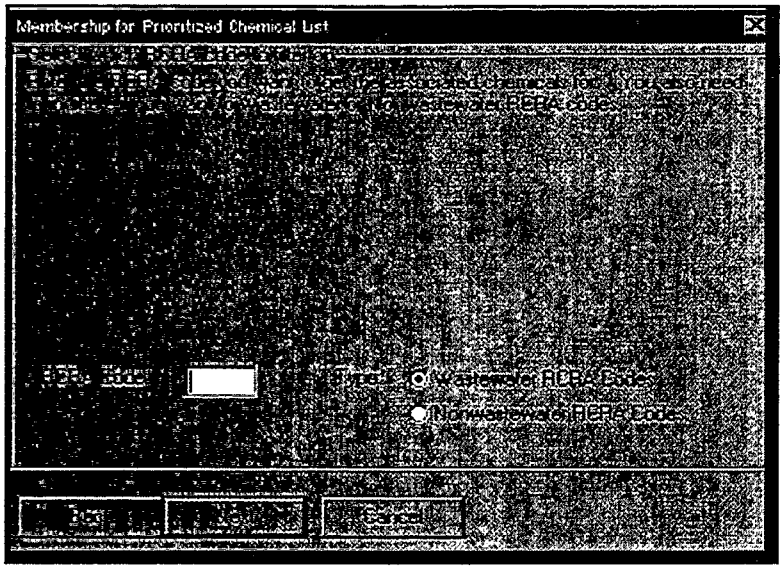
The list of chemicals is displayed with all chemicals are meet the defined filtering criteria. You can use the scroll bar located to the right of the list to move up and down through the available chemicals. Click on to move up one line or click on the shaded area just below the to page up. Click on to move down one line or click on the shaded area just above the to page down. Include all displayed chemicals in a chemical list by clicking SELECT ALL, or click to highlight a chemical name and click SELECT/REMOVE to change the membership designation to yes or no, respectively. Alternatively, double click in the membership column to change a chemical's membership designation to yes or no. All the filtered chemicals designated with a yes will be added to the defined chemical list. After completing chemical list modifications, click FINISH to save your changes and return to the WMPT main menu.

Filter by RCRA Code

After selecting the option to filter by RCRA code, click NEXT. The screen shown in Exhibit 2-24 appears. Select whether the RCRA code of interest is a wastewater or non-wastewater stream and enter the desired RCRA code number.

Click NEXT to view the members of the selected chemical list that are associated with the RCRA code you entered, sorted by either CAS number or chemical name. A screen similar to that shown in Exhibit 2-23 appears and displays the CAS number, chemical name, and a column indicating whether or not each chemical is a member of the selected list. In addition, the screen displays the RCRA code chosen in the *Filter by RCRA Code* screen. This code is displayed in the column titled "Filter."

EXHIBIT 2-24
Filter By RCRA Code Screen



The list of all chemicals that are members of the selected list and associated with the selected RCRA code sorted by CAS number is displayed. You can use the scroll bar located to the right of the list to move up and down through the available chemicals. Click on to move up one line or click on the shaded area just below the to page up. Click on to move down one line or click on the shaded area just above the to page down. Update a chemical's membership in the list by clicking to highlight a chemical name and clicking SELECT/REMOVE to change the membership designation to yes or no. Alternatively, double click in the membership column to change a chemical's membership designation to yes or no. Include all displayed chemicals in a chemical list by clicking SELECT ALL. After completing chemical list modifications, click FINISH to save your changes and return to the WMPT main menu.

Create a New Chemical List

After selecting *Create a New Chemical List* from the *Chemical Lists* menu, WMPT guides you through the process of adding a list using the following steps:

1. Enter a name for the new chemical list in the space provided. This name can include special characters such as blanks. Click on NEXT to advance to the next step, or CANCEL to cancel the Create a New Chemical List process.

2. Enter a chemical list identifier. This list identifier must contain eight characters or less with no blank spaces, for example "PCLIST" is the Prioritized Chemical List identifier. The list identifier you enter is added as a field in the WMPT chemical database and contains "Yes" to indicate WMPT chemicals included in the list or "No" to indicate WMPT chemicals not included in the list. After you enter the list identifier, click on FINISH, or CANCEL to cancel the Create a New Chemical List process.

3. Add chemicals to the new list using the WMPT database or by importing a list of CAS numbers from a comma-separated value (CSV) file. Select one of these options and click OK to continue or CANCEL to cancel the Create a New Chemical List process.

Add Chemicals to the New List Using the WMPT Database

If you selected the option to create a new chemical list using the WMPT database in step 3, a screen appears prompting you to choose to display the available WMPT chemicals sorted by chemical name or CAS number. Select either "Sort Chemicals by CAS Number" or "Sort Chemicals by Chemical Name" and click NEXT.

A screen that allows you to optionally filter the chemical list to show only those chemicals that meet specified criteria appears. You can filter the list by chemical RCRA Code associations or by another chemical attribute. To view all chemicals available to add to the chemical list, select "Do Not Filter" and click NEXT. To create a filter, select either "Filter by RCRA Code" or "Filter by a Chemical Attribute" and click NEXT. Each of these filters are described in more detail in the subsections below.

Filter by a Chemical Attribute

After selecting the option to filter by a chemical attribute, click NEXT. The screen shown in Exhibit 2-22 appears. Apply filtering criteria to select a subset of the WMPT chemicals to be viewed and added to the chemical list. To create filtering criteria, first click in the empty box below *Available Chemical Attributes* to display an alphabetical list of available chemical properties. Select the desired chemical attribute by clicking on it. Next, click in the empty box below *Operator* to display the list of available operators. Select the desired operator by clicking on it, and key enter the value to which the operator will be applied in the empty box below *Compare Value*. For example, to view the list of chemicals with reference dose concentrations less than 1 mg/kg/day, click on the *Operator* box next to the "Reference Dose (RfD), mg/kg/day" field and select the less than (<) operator. Click inside the *Comparison Value* box to the right of the Operator box and type "1."

Click on NEXT to view the WMPT chemicals in the list sorted by either CAS number or chemical name, and filtered according to the criteria defined in this step. The screen shown in Exhibit 2-23 appears and displays the CAS number, chemical name, and column indicating whether or not each chemical is a member of the new chemical list. In addition, the screen displays the filtered chemical property data that was selected in the *Chemical List Filtering* screen. This data is displayed in the column titled "Filter."

The list of chemicals is displayed with all chemicals that meet the defined filtering criteria sorted by either CAS number or chemical name is displayed. You can use the scroll bar located to the right of the list to move up and down through the available chemicals. Click on  to move up one line or click on the shaded area just below the  to page up. Click on  to move down one line or click on the shaded area just above the  to page down. Update a chemical's membership in the list by clicking to highlight a chemical name and clicking SELECT/REMOVE to change the membership designation to yes or no, respectively. Alternatively, double click in the membership column to change a chemical's membership designation to yes or no. Include all displayed chemicals in a chemical list by clicking SELECT ALL. After completing all additions to the new chemical list, click FINISH to save your new list and return to the WMPT main menu.

Filter by RCRA Code

After selecting the option to filter by RCRA code, click NEXT. The screen shown in Exhibit 2-24 appears. Select whether the RCRA code of interest is a wastewater or non-wastewater stream and enter the desired RCRA code number.

Click NEXT to view the WMPT chemicals of the selected chemical list that are associated with the RCRA code you entered and sorted by either CAS number or chemical name. The screen similar to that shown in Exhibit 2-23 appears and displays the CAS number, chemical name, and a column indicating

whether or not each chemical is a member of the selected list. In addition, the screen displays the RCRA code chosen in the filter by RCRA Code Screen. This code is displayed in the field named "Filter."

The list of chemicals that are associated with the selected RCRA code and sorted by either CAS number or chemical name is displayed. You can use the scroll bar located to the right of the list to move up and down through the available chemicals. Click on  to move up one line or click on the shaded area just below the  to page up. Click on  to move down one line or click on the shaded area just above the  to page down. Change a chemical's membership in the list by clicking to highlight a chemical name and clicking SELECT/REMOVE to change the membership designation to yes or no, respectively. Alternatively, double click in the membership column to change a chemical's membership designation to yes or no. Include all displayed chemicals in a chemical list by clicking SELECT ALL. After completing additions to the new chemical list, click FINISH to save your new list and return to the WMPT main menu.

Import a Chemical List Using a Comma-Separated Value File Containing CAS Numbers

If you decided to create a new chemical list using a comma-separated value (CSV) file in step 3, the *Select a CSV File to Import* screen appears. Enter the name of the desired CSV file in the *File Name* area of the screen. Select the directory that contains the file from the *Folders* box. Click OK to import the CAS numbers from the designated CSV file or CANCEL to exit the *Select a CSV File to Import* screen.

The first row of the CSV file to be imported must contain the word "CASNumber." In addition, the file MUST have only one CAS number per row. **Note that if the CSV file to be imported does not meet these format criteria, the import operation will be unsuccessful.**

2.4 VIEWING INFORMATION (VIEW MENU)

This section describes how to use the WMPT **View** menu to view chemical data, chemical scores, and scoring factor fencelines. The **View** menu contains the commands listed in Exhibit 2-25.

EXHIBIT 2-25
View Menu Commands

Command	Description
Chemical Data	Select chemical data to view by CAS number, chemical name, Chemical List, or RCRA code.
Fencelines	View factor scoring fencelines.
Chemical Synonyms	View available chemical synonyms.
Mass Data	View mass data detail or mass data summary.
Scores	View chemical PBT scores by CAS number, chemical name, Chemical List, or RCRA code.
Distribution of Scores	View graphical distribution of chemical PBT scores for the Prioritized Chemical List.

Note that WMPT does not allow you to edit any information displayed using the **View** menu. Refer to Section 2.3, *Editing Data*, if you wish to edit WMPT information. Each **View** menu command is discussed in detail in the following subsections.

2.4.1 Viewing Chemical Data

Selecting Chemicals to be Viewed

View WMPT chemical data by selecting *Chemicals* from the **View** menu. Select chemical(s) to view by clicking on one of the following secondary menus:

- *Select By CAS Number*;
- *Select By Chemical Name*;
- *Select A Chemical List*; and
- *Select By RCRA Code.*

Select a chemical to view using a CAS number by choosing *Select By CAS Number.* The *Select a Chemical* screen shown in Exhibit 2-16 will appear. This screen contains two parts, *Selected Chemical* and *Chemical CAS Numbers.* You can choose a specific chemical to view by typing the CAS number in the space provided in the *Chemical CAS Numbers* area. As you type in the CAS number, the list of available WMPT CAS numbers appears. Select the desired CAS number from the list when it appears by clicking on it once. Alternatively, you can use the scroll bar located to the right of the list to move up and down through the list of CAS numbers. Click on to move up one line or click on the shaded area just below the to page up. Click on to move down one line or click on the shaded area just above the to page down. After you select a CAS number, both the CAS number and the corresponding chemical name appear in the *Selected Chemical* area.

Select a chemical to view using chemical names by choosing *Select By Chemical Name.* The *Select a Chemical* screen shown in Exhibit 2-16 will appear. This screen contains two parts, *Selected Chemical* and *Chemicals in Database.* You can choose a specific chemical to view by typing the chemical name in the space provided in the *Chemicals in Database* area. As you type in the chemical name, the list of available WMPT chemical names appears. Select the desired chemical name from the list when it appears by clicking on it once. Alternatively, you can use the scroll bar located to the right of the list to move up and down through the list of chemical names. Click on to move up one line or click on the shaded area just below the to page up. Click on to move down one line or click on the shaded area just above the to page down. After you select a chemical name, both the chemical name and corresponding CAS number appear in the *Selected Chemical* area.

View all chemicals contained in a WMPT chemical list by choosing *Select A Chemical List.* The *Select a List of Chemicals* screen will appear and display all available WMPT chemical lists. You can use the scroll bar located to the right of the list to move up and down through the available chemical lists. Click on to move up one line or click on the shaded area just below the to page up. Click on to move down one line or click on the shaded area just above the to page down. Select a list of chemicals by clicking on the desired list name. After you select a chemical list, the list name appears at the top of the screen. For a more detailed description on how to create a WMPT chemical list, see *Editing and Creating Chemical Lists*, Section 2.3.5

View all chemicals associated with a specific RCRA code by choosing *Select By RCRA Code.* The *Select Chemicals by RCRA Code* screen will appear and displays all available WMPT RCRA codes and RCRA code descriptions. You can use the scroll bar to the right of the list to move up and down though the list of RCRA codes. Click on to move up one line or click on the shaded area just below

the to page up. Click on to move down one line or click on the shaded area just above the to page down. Select a RCRA code by clicking on the desired code.

Viewing Selected Chemicals

After you choose a chemical or group of chemicals to view, click on SELECT. The *View Chemicals* screen will appear with the CAS number and the name of the currently selected chemical at the top of the screen. The *View Chemicals* screen is nearly identical to the *Edit Chemicals* screen shown in Exhibit 2-17, except the *View Chemicals* information is displayed in gray boxes and cannot be edited. Tabs labeled for each of the WMPT scoring elements and several other elements are also located at top of the screen. You can maneuver between the tabs by clicking on the specific tab or by clicking on the NEXT and BACK buttons located at the bottom of the *View Chemicals* screen.

Each *View Chemicals* tab contains all the WMPT fenceline data elements used to calculate the associated tab subscore. The subscore is displayed in the upper left side of the screen beneath the selected CAS number and chemical name. To the right of the subscore is the data element name, the data element value, and the data element relative quality for the selected chemical. For example, the Bioaccumulation tab lists available log P, bioaccumulation factor, and bioconcentration factor data for the selected chemical, as well as the chemical bioaccumulation score.

Note that red text is used to indicate the factors driving the tab subscore. For example, if log P is displayed in red on the Bioaccumulation tab, the log P value for the selected chemical results in the highest concern bioaccumulation score.

If you chose to view data for a group of chemicals, the total number of chemicals in the group is listed at the bottom left corner of the *View Chemicals* screen along with the number of the current chemical displayed, for example, "1 of 69." To advance the display to the next chemical in the group, click on located to the right of the word "Chemical" at the bottom left of the screen. To go back to a chemical within the group, click on to the left of the word "Chemical." The currently displayed number will change as you click on the left and right arrows. You can select either the first or the last chemical in the group by clicking on or , respectively.

You can print the information on subscore tabs accessed using *View Chemicals* by clicking on PRINT at the bottom of each tab.

2.4.2 Viewing Fencelines (Thresholds)

You can view the fencelines (threshold values) used by WMPT to calculate subscores for each chemical by selecting *Fencelines* from the **View** menu. The *View Fencelines* screen appears. This screen consists of five areas: *Select a Component, Select a Factor, Quality of Data, Factor Scoring, and Methodology to be Used in Scoring*. The *View Fencelines* screen is nearly identical to the *Edit Fencelines* screen shown in Exhibit 2-18, except the information is displayed in gray boxes and cannot be edited. You can view WMPT scoring methodology and/or the fencelines applied to each scoring component data element by choosing different selections from each portion of the *View Fencelines* screen as described below.

Select a Component

View the list of WMPT scoring components by clicking on the down arrow to the right of the scoring component box in the *Select a Component* area. For example, Ecological Hazard is a scoring component. Select a component to edit by clicking on the component name.

Select a Factor

Select a factor or data element by clicking on the desired factor name in the *Select a Factor* area of the screen. For example, if you would like to view the fencelines applied to the Sediment Quality Tier I (FCV) data in the Ecological Hazard subscore, click on "Sediment Quality Tier I (FCV)" in the *Select a Factor* area.

Quality of the Data

After you select a factor, the relative data quality assigned to that factor is displayed graphically on the thermometer bar labeled with data quality tick marks and located in the *Quality of the Data* area of the screen.

Factor Scoring

The *Factor Scoring* area displays how the WMPT calculates a "High," "Medium," or "Low" score for the selected factor. A factor is assigned a score of "High" when the value meets the criteria assigned by the operand and value displayed to the right of "Scored High When." A factor is assigned a score of "Low" when the value meets the criteria assigned by the operand and value displayed to the right of "Scored Low When." A factor is assigned a score of "Medium" when the value falls between the "Scored High When" and "Scored Low When" criteria.

Method to be Used in Scoring

View the specific factor fenceline values in the *Method to be Used in Scoring* area, located at the bottom of the *View Fencelines* screen. WMPT Fenceline values are set based on user-defined constants, calculated by dividing factor data into a 1:1:1 distribution and setting fencelines equal to the distribution values; or calculated based on a user-defined distribution. The method used to generate a fenceline value and the actual fenceline value are displayed in the boxes to the right of *Constant Values*, *Range of Values in Database, divided into 3rds,* or *Distribution of Values in Database, using:*. The method used for the selected factor is indicated by a filled circle to the left of the method title.

2.4.3 Viewing Chemical Synonyms

View chemical synonyms available for a particular chemical by selecting *Chemical Synonyms* from the **View** Menu. The *View Chemical Synonyms* screen is divided into two areas: *Chemical Names* and *Alternate Chemical Names for [CAS number]*. The *View Chemical Synonyms* screen is nearly identical to the *Edit Chemical Synonyms* screen shown in Exhibit 2-19. Specify the chemical with a synonym you would like to view by typing the chemical name in the space provided in the *Chemical Names* area. As you type in the name, the list of available WMPT chemical names appears in the area below the box. Select the desired chemical from the list when it appears by clicking on the name once. Alternatively, you can use the scroll bar located to the right of the list to move up and down through the list of chemical names. Click on  to move up one line or click on the shaded area just below the to page up. Click on  to move down one line or click on the shaded area just above the to page down.

After you select a chemical, synonyms available (if any) for that chemical name are displayed in the *Alternate Chemical Names for [CAS number]* area (the specific CAS number for the selected chemical appears in the area title). There are two columns in this display, Name and Primary Name. Each available synonym is listed in the Name column. The Primary Name column contains "Yes" if the synonym is used as the primary name for the selected chemical in the WMPT or "No" if it is not.

2.4.4 Viewing Mass Data

You can view the attached or imported mass data by selecting *Mass Data* from the **View** menu. Select how you wish to view the mass data by clicking on one of the following secondary menus:

- *Detail*; and
- *Summarized.*

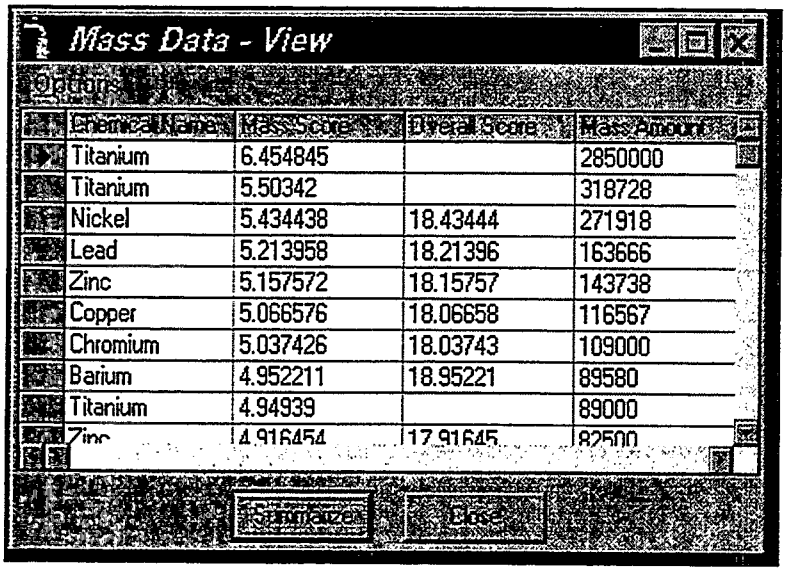
Each of these menus is discussed in the subsections below.

Viewing Mass Data Detail

View all of the mass data that is contained in the attached, imported, or manually-created table by choosing *Detail* from the *View Mass Data* secondary menu. The *Mass Data - View* screen shown in Exhibit 2-26 will appear. The screen displays a table with all of the mass data listed under the appropriate field names. Click on to move up one line or click on the shaded area just below the to page up. Click on to move down one line or click on the shaded area just above the to page down. Likewise, click on to move left one column or click on the shaded area just right of the to page left. Click on to move right one column or click on the shaded area just left of the to page right. NOTE: The mass data cannot be edited in the *Mass Data - View* screen. Refer to Section 2.3.4, *Editing Mass Data*, for a detailed discussion on how to edit mass data.

The *Mass Data - View* screen includes an **Options** menu that allows you to print the mass data or export the mass data to a CSV file. The *Derive Region* menu item is disabled in the *Mass Data - View* screen. Each of the **Options** menu items is described in more detail in the subsections below.

EXHIBIT 2-26
Mass Data - View Screen



Print

Select *Print* from the **Options** menu of the *Mass Data-View* screen to title and configure how the mass data will be printed, as well as send the data to the selected printer. After selecting *Print* from the menu, the *Grid Print - Options* screen shown in Exhibit 2-27 appears. Type in a title for the mass data printout in the box to the right of *Printout Title:* located at the top of the screen. Select the number of copies to print by key entering the desired number in the box to the right of *Copies:*, located below the *Printout Title:* area. You can also use the and buttons to the right of the *Copies:* box to advance the number of copies to print up or down. Select the desired orientation for the printout by clicking on either *Landscape* or *Portrait* located in the *Page Orientation* box just below the *Copies:* area.

When the title, number of copies, and printout orientation have been set, click OK to send the mass data to the printer. Click on CANCEL to exit the *Grid Print - Options* screen and return to the *Mass Data - View* screen.

Export

Select *Export* from the **Options** menu of the *Mass Data-View* screen to export the mass data to a *.CSV file. A *.CSV file is a comma-separated value file and is discussed in more detail in Section 2.2.5 under the subsection heading *Importing a CSV File*. After selecting *Export* from the menu, the *Export the Grid* screen shown in Exhibit 2-28 appears. Enter the desired file name for the *.CSV file in the *File Name* area. Select the target directory into which the *.CSV file will be created and saved from the *Folders* box.

EXHIBIT 2-27
Grid Print - Options Screen

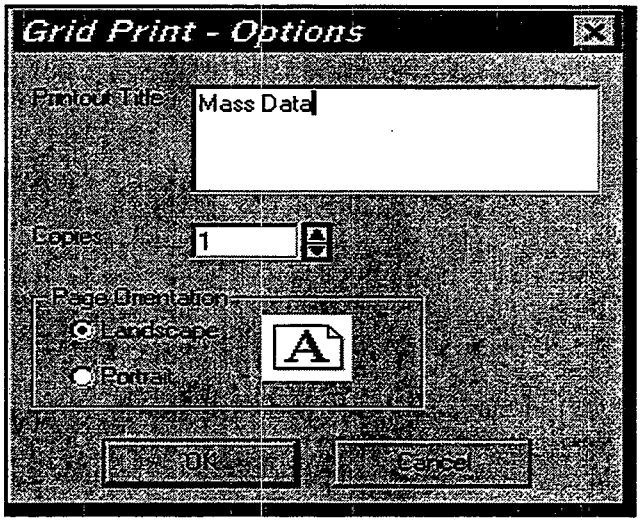
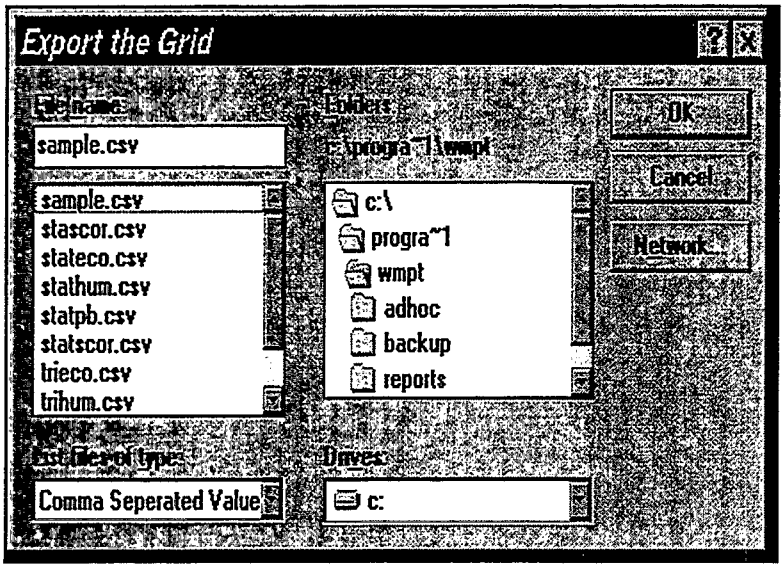


EXHIBIT 2-28
Export the Grid Screen



Click OK to save the mass data into the *.CSV file. Click CANCEL to close the *Export the Grid* screen and return to the *Mass Data - View* screen.

You can view the mass data scores, as well as the PBT and Overall scores for the chemicals contained in the mass data summarized table according to a specified format by clicking on SUMMARIZE, located at the bottom of the *Mass Data - View* screen. This feature is described in more detail in the subsections below. Click on CLOSE to exit the *Mass Data - View* screen.

Viewing Mass Data In User-Defined Format (Summarized)

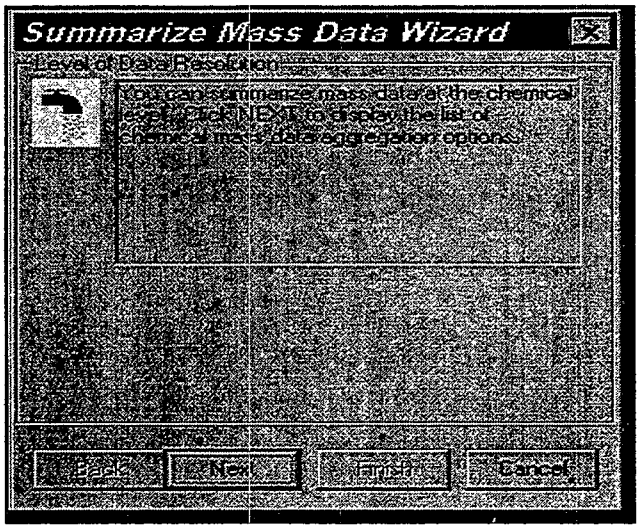
You can view the mass data scores, as well as the PBT and Overall scores for the chemicals contained in the mass data summarized table according to a specified format by choosing *Summarized* from the *View Mass Data* secondary menu. If you are already viewing the mass data in detail (in the *Mass Data - View* screen), click on SUMMARIZE at the bottom of the screen to summarize the data. After selecting *Summarized* or clicking on SUMMARIZE, the Summarize Mass Data Wizard is activated and will guide you through the process of defining how to summarize the mass data scores. The steps for summarizing the mass data scores using the Wizard are listed below:

Step 1 - Level of Data Resolution
Step 2 - Select an Aggregation Level
Step 3 - Specify a Filter (optional)

Summarize Mass Data Wizard Step 1 - Level of Data Resolution

The Summarize Mass Data Wizard *Level of Data Resolution* screen is shown in Exhibit 2-29. This screen explains that you can summarize the mass data at the chemical level using the selected aggregation level. The mass data that you view at the end of the *Summarize Mass Data Wizard* steps will include each chemical's mass and PBT score, as well as the Overall Score. Click NEXT to advance to Step 2.

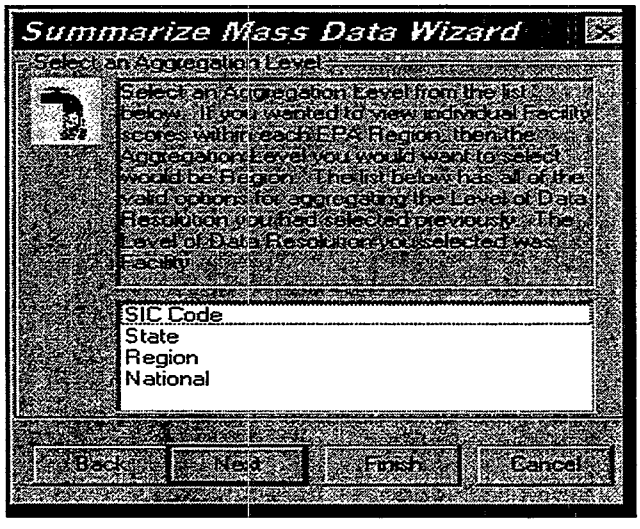
EXHIBIT 2-29
Level of Data Resolution Screen



Summarize Mass Data Wizard Step 2 - Select an Aggregation Level

The Summarize Mass Data Wizard *Select an Aggregation Level* screen is shown in Exhibit 2-30. The available aggregation levels for the mass data are displayed in decreasing order. The aggregation level that is selected in this step determines on which level the mass data scores will be grouped and displayed. For example, to view chemical mass data scores aggregated at the state level, select State in the *Select an Aggregation Level* screen. WMPT will calculate and display the Overall (PBT and mass) score for all chemicals in that state. The aggregation levels that are available to choose are dependent upon the level of detail contained in the attached, imported, or manually-entered mass data.

EXHIBIT 2-30
Select an Aggregation Level Screen



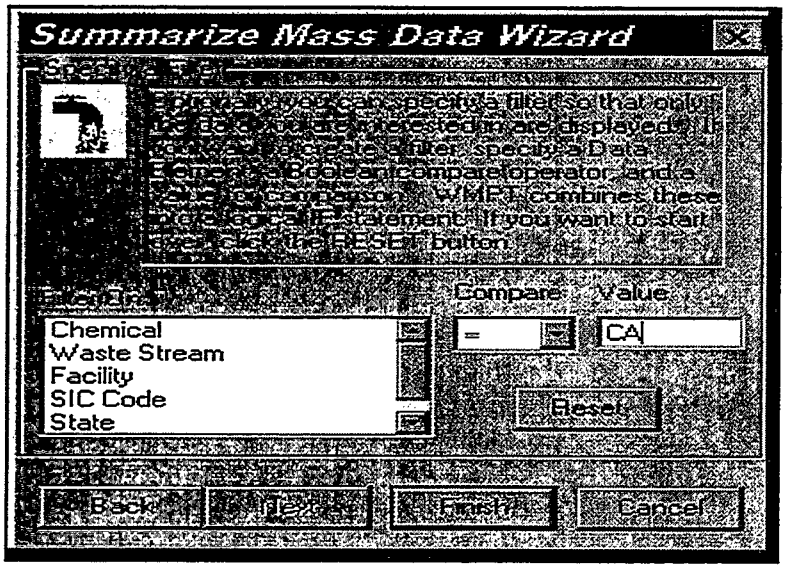
Select an aggregation level by clicking on the desired level and then clicking NEXT to advance to Step 3. You can also select the aggregation level and advance to the next step by double-clicking on the desired level. Since Step 3 is optional, you can advance directly to the *PBT & Mass Scores* display screen

by clicking on FINISH (the display screen is described in detail later in this subsection). NOTE: The NEXT and FINISH buttons are inactive until an aggregation level is selected. To go back to Step 1, *Level of Data Resolution*, click on BACK. To end the Summarize Mass Data Wizard, click on CANCEL.

Summarize Mass Data Wizard Step 3 - Specify a Filter

The optional *Specify a Filter* step allows you to narrow down the mass data selected for viewing. If this step is omitted, all of the mass data contained in the attached, imported, or manually-entered table will be used in creating the summarized data view. For example, a mass table can contain data from all 50 states. By using the *Specify a Filter* step of the Summarize Mass Wizard, you can filter this data down to only the chemical data associated with the state of California. The *Specify a Filter* screen is shown in Exhibit 2-31.

EXHIBIT 2-31
Specify a Filter Screen



All of the mass data fields available to be filtered appear in the *Filter On* list on the left side of the *Specify a Filter* screen. To apply a filter to one of these fields, select the desired field by clicking on the field name. You can scroll up and down through the list of fields by clicking on and , respectively.

Select a filter operator by clicking on the empty box in the *Compare* area, located to the right of the *Filter On* list. The list of operator symbols appear below the box. Select the desired operator by clicking on its symbol. The list will disappear and the selected symbol will appear in the *Compare* box.

Enter a value to be used in the filter as the limiting factor by clicking once in the empty box in the *Value* area, located to the right of the *Compare* box. You must manually enter a value in the box. The value may be a character or numeric value, depending on the format of the selected field.

For example, display only the mass data associated with the state of California by:

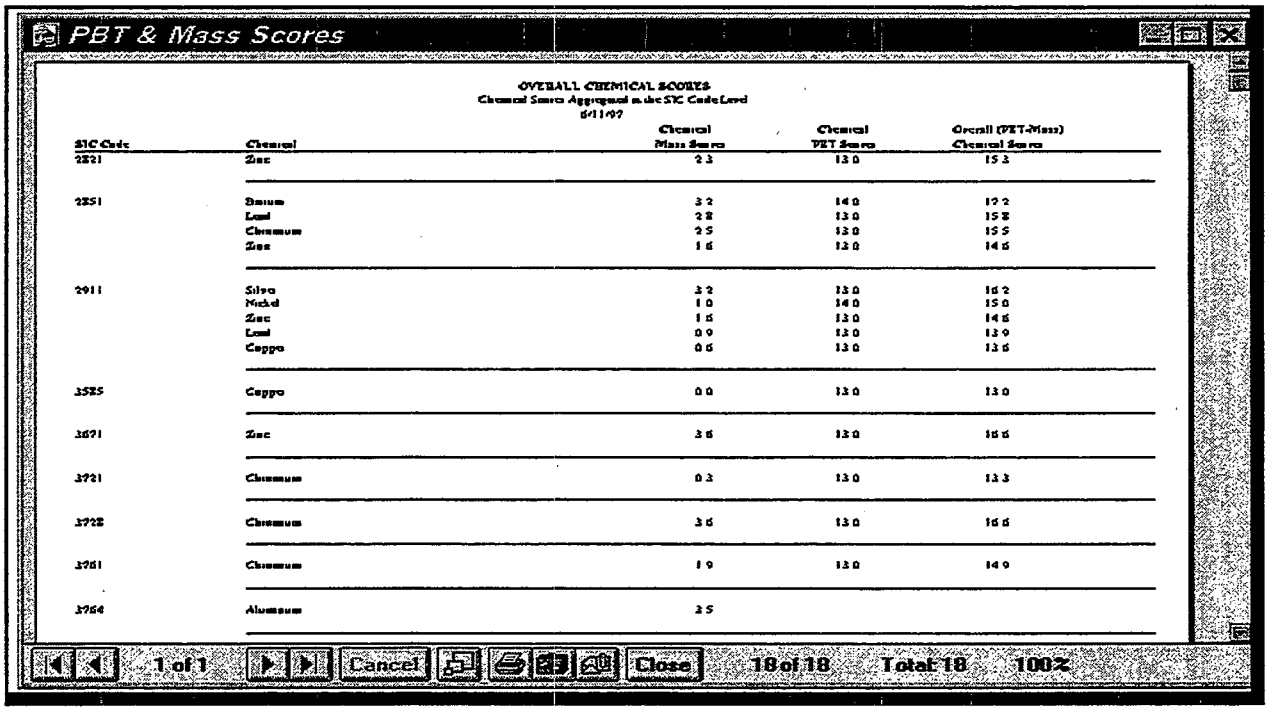
1. Clicking on State in the *Filter On* list;
2. Clicking on "=" in the *Compare* operator list; and
3. Entering "CA" in the *Value* box.

After defining the filter, click on FINISH to view the summarized mass data. To remove the filter, simply click on RESET, and all of the selections made in this step are removed. To go back to Step 2, *Select an Aggregation Level*, click on BACK. To end the Summarize Mass Data Wizard, click on CANCEL.

Viewing the Summarized Mass Data Results

After clicking FINISH from the Summarize Mass Data Wizard, the mass, PBT, and Overall scores are displayed for each chemical and aggregated according to the selection in Step 2. An example of the *Overall Chemical Scores* view screen is shown in Exhibit 2-32. You can print the data or export the data to the selected file format by using the viewing tools located at the bottom of the screen. These tools are described in more detail in Section 2.6.1, *Report Viewing Tools*.

EXHIBIT 2-32
Overall Chemical Scores View Screen



After viewing, printing, and/or exporting the summarized mass data, click on CLOSE to return to the WMPT main menu bar.

2.4.5 Viewing Chemical Scores

Selecting Chemicals to be Viewed

View the overall chemical scores calculated by WMPT by selecting *Scores* from the **View** menu. Select chemical score(s) to view by clicking on one of the following secondary menus:

- *Select By CAS Number*;
- *Select By Chemical Name*;
- *Select A Chemical List*; and
- *Select By RCRA Code.*

Select a chemical score to view using a CAS number by choosing *Select By CAS Number.* The *Select a Chemical* screen shown in Exhibit 2-16 will appear. This screen contains two parts, *Selected Chemical* and *Chemical CAS Numbers.* You can choose a specific chemical by typing the CAS number in the space provided in the *Chemical CAS Numbers* area. As you type in the CAS number, the list of available WMPT CAS numbers appears. Select the desired CAS number from the list when it appears by clicking on it once. Alternatively, you can use the scroll bar located to the right of the list to move up and down through the list of CAS numbers. Click on to move up one line or click on the shaded area just below the to page up. Click on to move down one line or click on the shaded area just above the to page down. After you select a CAS number, both the CAS number and the corresponding chemical name appear in the *Selected Chemical* area.

Select a chemical score to view using chemical names by choosing *Select By Chemical Name.* The *Select a Chemical* screen shown in Exhibit 2-16 will appear with Chemical Name in the lower half of the screen rather than CAS number. This screen contains two parts, *Selected Chemical* and *Chemicals in Database.* You can choose a specific chemical by typing the chemical name in the space provided in the *Chemicals in Database* area. As you type in the chemical name, the list of available WMPT chemical names appears. Select the desired chemical name from the list when it appears by clicking on it once. Alternatively, you can use the scroll bar located to the right of the list to move up and down through the list of chemical names. Click on to move up one line or click on the shaded area just below the to page up. Click on to move down one line or click on the shaded area just above the to page down. After you select a chemical name, both the chemical name and corresponding CAS number appear in the *Selected Chemical* area.

View the overall score and subscores for all chemicals contained in a WMPT chemical list by choosing *Select A Chemical List.* The *Select a List of Chemicals* screen will appear and display all available WMPT chemical lists. You can use the scroll bar located to the right of the list to move up and down through the available chemical lists. Click on to move up one line or click on the shaded area just below the to page up. Click on to move down one line or click on the shaded area just above the to page down. Select a list of chemicals by clicking on the desired list name. After you select a chemical list, the list name appears at the top of the screen. For a more detailed description on how to create a WMPT chemical list, see *Editing and Creating Chemical Lists*, Section 2.3.5.

View the overall score and subscores for all chemicals associated with a specific RCRA code by choosing *Select By RCRA Code.* The *Select Chemicals by RCRA Code* screen will appear and display all available WMPT RCRA codes and RCRA code descriptions. You can use the scroll bar to the right of the list to move up and down though the list of RCRA codes. Click on to move up one line or click on the shaded area just below the to page up. Click on to move down one line or click on the shaded area just above the to page down. Select a RCRA code by clicking on the desired code.

Viewing Selected Chemical Scores

After you choose a chemical or group of chemicals for which you would like to view the overall scores and subscores, click on SELECT. The *View Scores* screen shown in Exhibit 2-33 appears with the CAS number and name of the currently selected chemical displayed at the top of the screen. The *View Scores* screen also displays the Overall Chemical score; the Human Health Risk Potential score; the Human Toxicity score and the associated Cancer effect and Noncancer effect scores; the Human Exposure score and the associated Persistence (P), Bioaccumulation (B), and Mass (M) scores; the Ecological Risk Potential score; the Ecological Toxicity score and associated Aquatic Toxicity (AT) score; and the Ecological Exposure score and associated Persistence (P), Bioaccumulation (B), and Mass (M) scores. View a key describing the notations used on this screen by clicking KEY. The screen shown in Exhibit 2-34 appears.

Note that the *View Scores* screen also displays how the individual scores are manipulated to generate the overall chemical scores. Each score displayed is generated as follows:

- The Human Toxicity Score is the higher of the Cancer (C) effect and Noncancer (NC) effect scores.
- The Human Exposure Potential score is the sum of the Persistence (P), Bioaccumulation (B), and Mass (M) scores. ***Note that Mass scores are not currently included in the Human Exposure Potential, Human Health Risk Potential, and Overall Chemical scores.***
- The Human Health Risk Potential score is the sum of the Human Toxicity and Human Exposure Potential scores.
- The Ecological Toxicity score is equal to the Aquatic Toxicity (AT) score.
- The Ecological Exposure Potential score is the sum of the Persistence (P), Bioaccumulation (B), and Mass (M) scores. ***Note that Mass scores are not currently included in the Ecological Exposure Potential, Ecological Risk Potential, and Overall Chemical scores.***
- The Ecological Risk Potential score is the sum of the Ecological Toxicity and Ecological Exposure Potential scores.
- The Overall Chemical score is the sum of the Human Health Risk Potential and Ecological Risk Potential scores.

You can view the underlying data used to calculate each displayed score by clicking on WHY located in each subfactor box. Clicking on WHY displays the *View Chemicals* screen with the corresponding subfactor tab, similar to that shown for *Edit Chemical Data* in Exhibit 2-17 as described in *View Chemical Data*, Section 2.4.1.

If you chose to view scores for a group of chemicals, the total number of chemicals in the group is listed at the bottom left corner of the *View Scores* screen along with the number of the current chemical displayed, for example, "1 of 69." To advance the display to the next chemical in the group, click on ▶| located to the right of "Chemical Scores" at the bottom left of the screen. To go back to a chemical within the group, click on |◀ to the left of the word "Chemical Scores." The currently displayed number changes as you click on the left and right arrows. You can select either the first or the last chemical in the group by clicking on |◀◀ or ▶▶|, respectively.

You can print the scoring information for the currently displayed chemical by clicking on PRINT at the bottom of the *View Scores* screen.

EXHIBIT 2-33
View Scores Screen

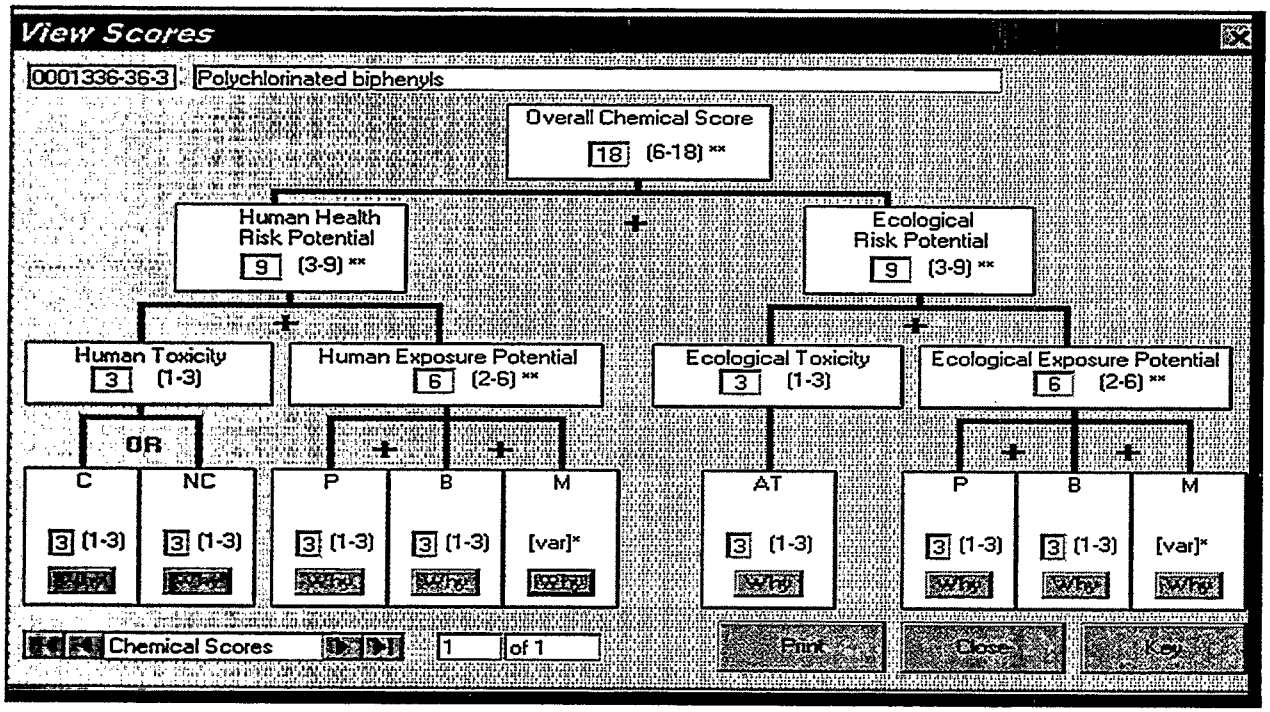
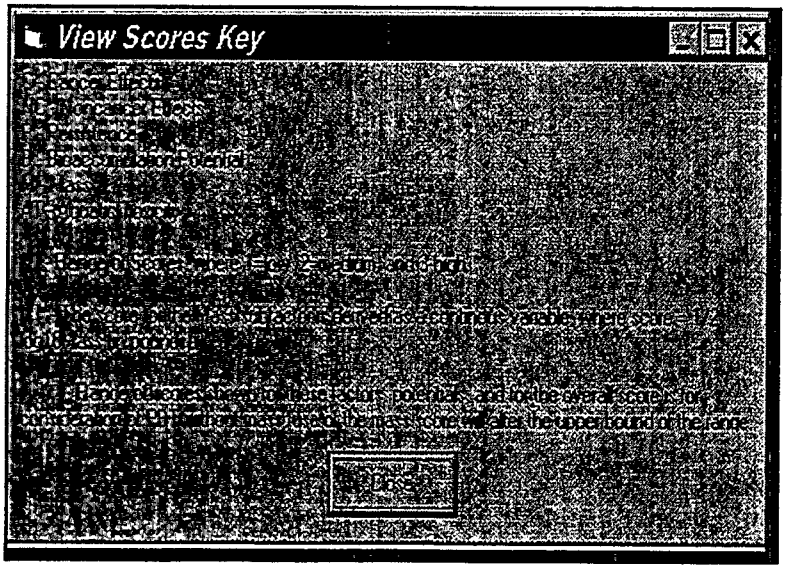


EXHIBIT 2-34
View Scores Key

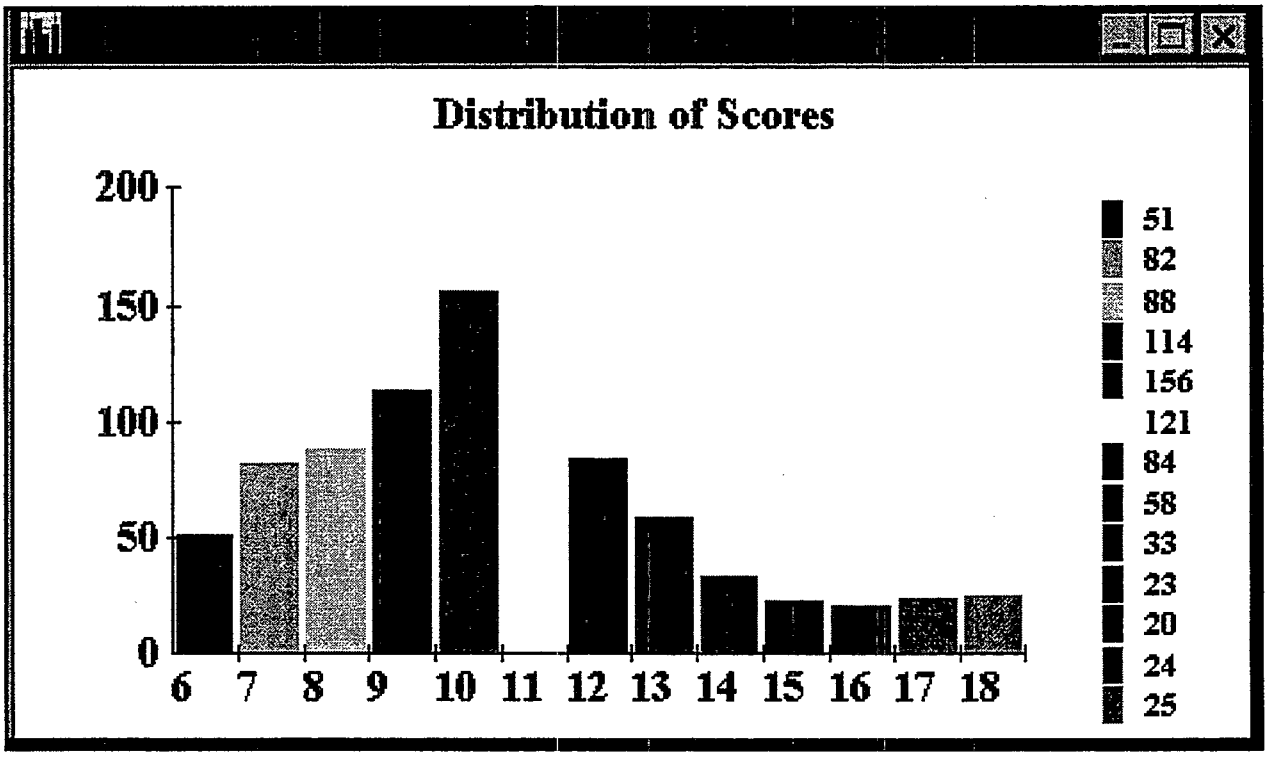


2.4.6 Viewing the Distribution of Scores

You can view a graphical representation of the overall distribution of chemical PBT scores for the Prioritized Chemical List by selecting *Distribution of Scores* from the **View** menu. The distribution of scores is displayed in a bar graph numbered from six to 18 (i.e., the lowest possible score to the highest possible score) along the X-axis with the number of chemicals assigned that score along the Y-axis. The *Distribution of Scores* screen is shown in Exhibit 2-35.

Placing your pointer on a score bar and clicking the right mouse button brings up an additional menu. This menu allows you to print the graphical distribution, view chemical data for chemicals with the selected score (see Section 2.4.1), view scores for chemicals with the selected score (see Section 2.4.5), and calibrate the graphical display if you have resized the view score distribution window.

EXHIBIT 2-35
Distribution of Scores Screen



2.5 SCORING CHEMICALS (SCORE MENU)

This section describes how to use the WMPT **Score** menu to calculate a mass score for the WMPT chemicals. You can also calculate the persistence score and the overall chemical score for the WMPT chemicals or the National Measurement List *[scoring of the National Measurement List is not currently functional]*. The **Score** menu contains the commands listed in Exhibit 2-36.

EXHIBIT 2-36
Score Menu Commands

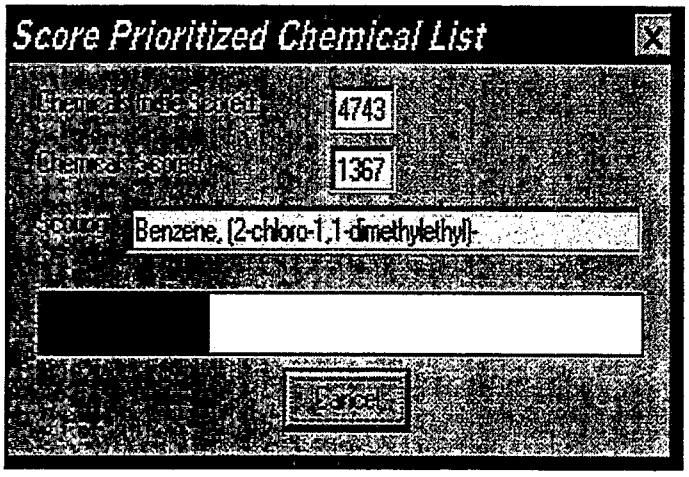
Command	Description
PBT Score	Calculate overall PBT scores for the WMPT chemicals.
Mass Score	Calculate overall PBT and mass scores for the WMPT chemicals.

2.5.1 Calculating Overall PBT Scores

You can calculate the overall PBT scores for the Prioritized Chemical List (i.e., the WMPT chemicals that are associated with data for at least one data element for each scoring subfactor) by selecting *PBT Score* from the **Score** menu. WMPT will calculate the overall PBT score for each chemical based on available data for each of the scoring components. The result of the Prioritized Chemical List scoring is an overall PBT score ranging from six to 18 for each of the WMPT chemicals. For a detailed description on the overall PBT scoring, see *Scoring the Human and Ecological Exposure Potentials*, Appendix B, and *Scoring the Human and Ecological Hazard Potentials*, Appendix C.

After selecting *PBT Score* from the **Score** menu, your computer will become busy while WMPT calculates the overall PBT scores, and the *Score Prioritized Chemical List* progress screen shown in Exhibit 2-37 will appear. The progress screen displays the total number of chemicals to be scored in the space to the right of *Chemicals to Be Scored:*, the number of chemicals scored in the space to the right of *Chemicals Scored:*, and the name of the chemical that is currently being scored in the space to the right of *Scoring:*. The screen also displays the scoring progress graphically with a horizontal thermometer bar. The filled area progresses from left to right on the bar as the scoring progresses.

EXHIBIT 2-37
Score Prioritized Chemical List Progress Screen



You can interrupt the scoring at any time by clicking on CANCEL. A window will appear displaying the message "Scoring Was Canceled." Click on OK to close the message window. When the scoring is complete, a window displaying the message "[number] chemicals were scored" appears, listing the total number of chemicals at the beginning of the message. Click on OK to close the message window.

It is recommended that you save the database at this time by selecting *Save* from the **File** menu or by clicking on the toolbar save icon.

2.5.2 Calculating PBT and Mass Scores

You can calculate both the overall PBT scores and the mass scores for the chemicals contained in the attached, imported, or manually-entered mass data table by selecting *Mass Score* from the **Score** menu. WMPT will calculate the overall PBT score for each chemical based on available data for each of the scoring components. The result of this scoring is an overall PBT score ranging from six to 18 for each of the mass data table chemicals. WMPT will also calculate a mass score and an overall score for each of the chemicals contained in the mass data table based on the mass amount and PBT score that is associated with each chemical. The result of this scoring is a mass score equal to the $\log_{10}$ of the mass amount for each chemical. The overall score is then calculated by adding together the PBT and mass scores. For a detailed description on the calculation of the mass and overall scores, see *The WMPT Scoring Approach*, Appendix A. For a detailed description on the overall PBT scoring, see *Scoring the Human and Ecological Exposure Potentials*, Appendix B, and *Scoring the Human and Ecological Hazard Potentials*, Appendix C.

After selecting *Mass Score* from the **Score** menu, the *Selected Score Option* screen appears describing what components are about to be scored. Click OK to begin the scoring or click CANCEL to return to the WMPT main menu bar without scoring. After clicking OK, your computer will become busy while WMPT calculates the overall PBT, mass, and overall scores, and the *Score Mass* progress screen will appear. This screen is very similar to the *Score Prioritized Chemical List* progress screen shown in Exhibit 2-37. The progress screen displays the total number of chemicals to be scored in the space to the right of *Chemicals to Be Scored:*, the number of chemicals scored in the space to the right of *Chemicals Scored:*, and the name of the chemical that is currently being scored in the space to the right of *Scoring:*. The screen also displays the scoring progress graphically with a horizontal thermometer bar. The filled area progresses from left to right on the bar as the scoring progresses.

You can interrupt the scoring at any time by clicking on CANCEL. A window will appear displaying the message "Scoring Was Canceled." Click on OK to close the message window. When the scoring is complete, a window displaying the message "[number] chemicals were scored" appears, listing the total number of chemicals at the beginning of the message. Click on OK to close the message window. It is recommended that you save the database at this time by selecting *Save* from the **File** menu or by clicking on the toolbar save icon.

2.6 GENERATING REPORTS (REPORTS MENU)

This section describes how to use the WMPT **Reports** menu to create, print, and export reports. The **Report** menu contains the commands listed in Exhibit 2-38.

EXHIBIT 2-38
Report Menu Commands

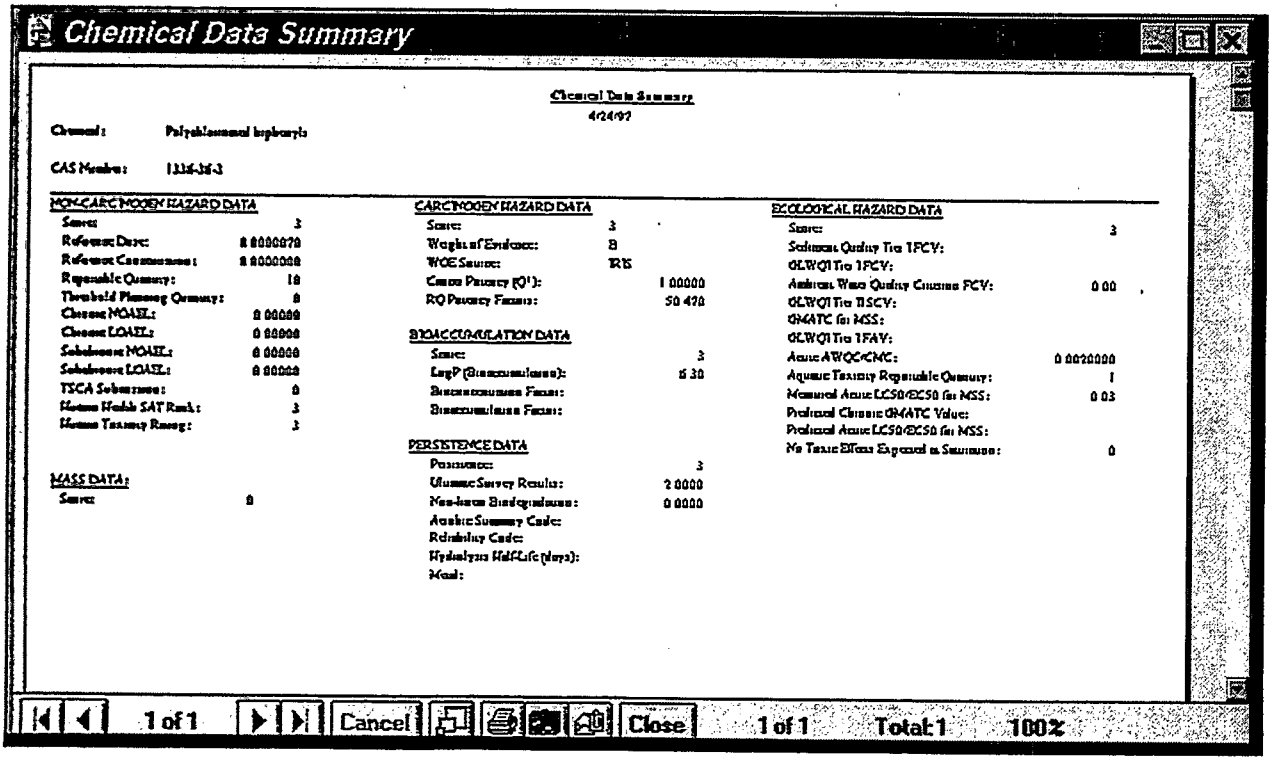
Command	Description
Mass Scoring Summary	Mass scoring report.
Fenceline Summary	Fenceline report.
Chemical List Report	PBT score report for chemical lists.
Chemical Data Summary	Single page report for chemical(s) that contains all ecological and human hazard and exposure data.
Advanced Report Query	Create a customized report.

Each of the **Report** menu commands are discussed in detail in the following subsections.

2.6.1 Report Viewing Tools

You can route each report described in this section either to your computer screen to be viewed or directly to your printer. Exhibit 2-39 is a sample chemical data summary report. A report status section and report viewing tools are displayed at the bottom of the screen. These tools are described below and are available for every report generated from the **Reports** menu.

EXHIBIT 2-39
Chemical Data Summary Report



Report Status

The current page and the total number of pages in the report is displayed on the lower left side of the viewing window, for example "1 of 8." Traverse the report one page at a time by clicking on to advance a page or to go back a page. You can also return to the first page by clicking on or advance directly to the last page by clicking on .

Cancel

Click on CANCEL to stop generating the selected report. Click on CLOSE to return to the WMPT menu bar.

Zoom

Zoom in and out of the report by clicking on the zoom button. Click on this button multiple times until the desired view is displayed.

Printing

You can send the report to the printer directly from the viewing window by clicking on the printer button. A screen appears asking you to confirm your printer selection. You can also choose to print the entire report, print a range of pages, or print multiple copies of the report from this window. Click on OK to send the report to the printer or CANCEL to return to the report view. A status window appears as the report is being compiled for the printer. To cancel the print job once it has started, click on CANCEL PRINTING.

Export the Report to a File

Save the data presented in the report to a separate file to transfer into another application, such as a spreadsheet, another database, or document, by clicking on the suitcase icon at the bottom of the screen. The *Export* screen will appear. Select a file format for the report data by clicking on the blank space beneath the *File Format* title. Select a specific file format by clicking on the format name. The following export formats are currently available in the WMPT:

- Character-separated values;
- Comma-separated values (*.csv);
- Data interchange format (*.dif);
- Record style (columns of values);
- Tab-separated text;
- Tab-separated values; and
- Text.

Choose a destination for the exported file. There is currently only one destination option: Save to a disk file.

After selecting the export file format and destination, click on OK. Follow the instructions on subsequent screens to specify the character used to separate text and/or values in the export file, saving the date and number formats used by the report, and choosing the location to save the new file and name for the new file. Click on OK to save the output into the file. To exit the exporting procedure at any time, click on CANCEL.

Close

After viewing, printing, and/or exporting the report data, click on CLOSE to return to the WMPT main menu bar.

2.6.2 Mass Scoring Summary Report

The Mass Scoring Summary Report activates the Summarize Mass Data Wizard. The Wizard will guide you through the process if defining how to summarize the chemical mass data scores into a report. Activate the Wizard by selecting *Mass Scoring Summary* from the **Reports** menu. The Summarize Mass Data Wizard can also be activated from the **View** menu by selecting *Mass Data, Summarized* or by clicking SUMMARIZE from in the *Mass Data - View* screen, as previously described in Section 2.4.4. The steps for summarizing the mass data scores using the Wizard are listed below:

Step 1 - Level of Data Resolution
Step 2 - Select an Aggregation Level
Step 3 - Specify a Filter (optional)

Summarize Mass Data Wizard Step 1 - Level of Data Resolution

The Summarize Mass Data Wizard *Level of Data Resolution* screen is shown in Exhibit 2-29. This screen explains that you can summarize the mass data at the chemical level using the selected aggregation level. The mass data that you view at the end of the *Summarize Mass Data Wizard* steps will include each chemical's mass and PBT score, as well as the Overall Score. Click NEXT to advance to Step 2.

Summarize Mass Data Wizard Step 2 - Select an Aggregation Level

The Summarize Mass Data Wizard *Select an Aggregation Level* screen is shown in Exhibit 2-30. The available aggregation levels for the mass data are displayed in decreasing order. The aggregation level that is selected in this step determines on which aggregation level the chemical mass data scores will be grouped and displayed. For example, to view chemical mass data scores aggregated at the state level, select State in the *Select an Aggregation Level* screen. WMPT will calculate and display the Overall (PBT and mass)score for all chemicals in that state. The aggregation levels that are available to choose are dependent upon the level of detail contained in the attached, imported, or manually-entered mass data.

Select an aggregation level by clicking on the desired level and then clicking NEXT to advance to Step 3. You can also select the aggregation level and advance to the next step by double-clicking on the desired level. Since Step 3 is optional, you can advance directly to the *PBT & Mass Scores* display screen by clicking on FINISH (the display screen is described in detail later in this subsection). NOTE: The NEXT and FINISH buttons are inactive until an aggregation level is selected. To go back to Step 1, *Level of Data Resolution*, click on BACK. To end the Summarize Mass Data Wizard, click on CANCEL.

Summarize Mass Data Wizard Step 3 - Specify a Filter

The optional *Specify a Filter* step allows you to narrow down the mass data selected for viewing. If this step is omitted, all of the mass data contained in the attached, imported, or manually-entered table will be used in creating the summarized data view. For example, a mass table can contain data from all 50 states. By using the *Specify a Filter* step of the Summarize Mass Wizard, you can filter this data down to only the chemical data associated with the state of California. The *Specify a Filter* screen is shown in Exhibit 2-31.

All of the mass data fields available to be filtered appear in the *Filter On* list on the left side of the *Specify a Filter* screen. To apply a filter to one of these fields, select the desired field by clicking on the field name. You can scroll up and down through the list of fields by clicking on  and , respectively.

Select a filter operator by clicking on the empty box in the *Compare* area, located to the right of the *Filter On* list. The list of operator symbols appear below the box. Select the desired operator by clicking on its symbol. The list will disappear and the selected symbol will appear in the *Compare* box.

Enter a value to be used in the filter as the limiting factor by clicking once in the empty box in the *Value* area, located to the right of the *Compare* box. You must manually enter a value in the box. The value may be a character or numeric value, depending on the format of the selected field.

For example, display only the mass data associated with the state of California by:

1. Clicking on State in the *Filter On* list;
2. Clicking on "=" in the *Compare* operator list; and
3. Entering "CA" in the *Value* box.

After defining the filter, click on FINISH to view, print, or export the summarized mass data. To remove the filter, simply click on RESET and all of the selections made in this step are removed. To go back to Step 2, *Select an Aggregation Level*, click on BACK. To end the Summarize Mass Data Wizard, click on CANCEL.

After clicking FINISH, the Mass Data Summary Report is displayed on the screen. Refer to Section 2.6.1, *Report Viewing Tools* for detailed information on how to use the report viewing tools located at the bottom of the report viewing screen.

2.6.3 Fenceline Summary Report

The Fenceline Summary Report presents an overview of each WMPT fenceline (threshold value) used to calculate the subscores for each chemical. This report is divided into sections for each chemical subscore: Bioaccumulation, Persistence, Ecological Hazard, Human Carcinogen Hazard (WOE = A or B), Human Carcinogen Hazard (WOE = C), and Human Noncarcinogen Hazard. Each section contains a list of all data elements used to calculate each subscore. Each subscore listing includes:

- Name of the database containing the data element,
- Data element field name within the database,
- Internal fenceline number (used for WMPT internal tracking),

- Actual fenceline values and the criteria applied to calculate a "High," "Medium," or "Low" subscore. For example, chemicals with a Log K_{ow} of 3.5 or less will be assigned a bioaccumulation subscore of 1 (or "Low")

- Method used to generate fenceline values: constant values, calculated values generated by dividing the data contained in the WMPT database into thirds, or calculated values generated by dividing the data into a distribution other than thirds.

Generate the Fenceline Summary Report by selecting *Fenceline Summary Report* from the **Reports** menu. The *Output Destination(s)* screen appears. You can choose to view the report on your computer screen or to output the report directly to a printer. The report format viewed on the screen is also the format used to print the report. Refer to Section 2.6.1 for information on using report viewing tools. After you have completed viewing, printing, and/or exporting the report data, click on CLOSE at the bottom of the viewing screen to return to the system.

2.6.4 Chemical List Report

The Chemical List Report lists each WMPT subscore and the overall PBT score for each chemical in a selected chemical list. For a detailed description on how to create a chemical list, see *Editing and Creating Chemical Lists*, Section 2.3.5.

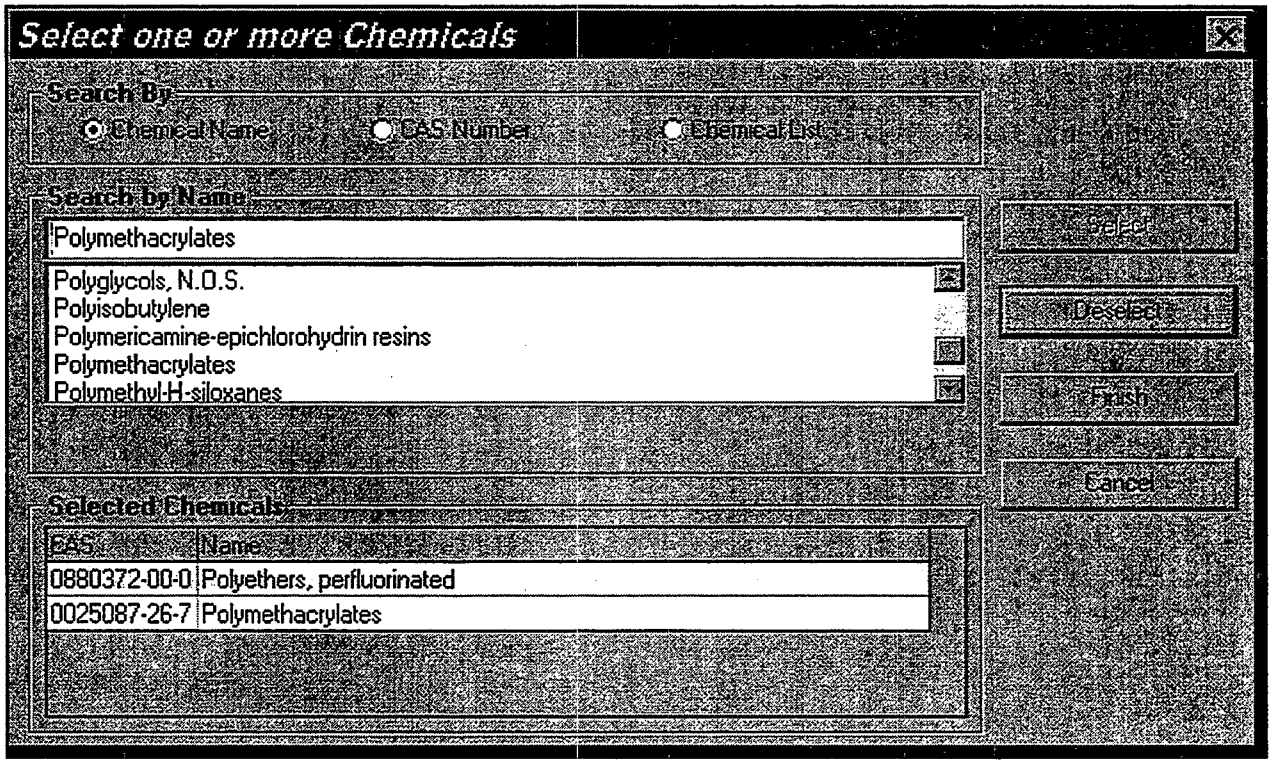
Generate the Chemical List Report by selecting *Chemical List Report* from the **Reports** menu. Select a chemical list by clicking on the desired list name and clicking on SELECT. You can also select the chemical list by double-clicking on the list name. The *Output Destination(s)* screen will appear. You can choose to view the report on your computer screen or to output the report directly to a printer. The report format viewed on the screen is also the format used to print the report. Refer to section 2.6.1 for information on using report viewing tools. After you have completed viewing, printing, and/or exporting the report data, click on CLOSE located at the bottom of the viewing screen to return to the system.

2.6.5 Chemical Data Summary Report

The Chemical Data Summary Report summarizes all the WMPT data for a chemical on a single page. Each data element is displayed by grouping it with the respective subscore component: Bioaccumulation, Persistence, Ecological Hazard, Human Carcinogen Hazard (WOE = A or B), Human Carcinogen Hazard (WOE = C), and Human Noncarcinogen Hazard. The report also includes the chemical name and CAS number. If you select more than one chemical for the Data Summary Report, the data for each chemical appears on a separate page.

Generate a Chemical Data Summary Report by selecting *Chemical Data Summary Report* from the **Reports** menu. The *Output Destination(s)* screen will appear. You can choose to view the report on your computer screen or to output the report directly to a printer. After selecting the output destination, a screen appears that allows you to select one or more chemicals or an entire chemical list to route to the chemical list report. The *Select One or More Chemicals* screen shown in Exhibit 2-40 appears.

EXHIBIT 2-40
Select One or More Chemicals Screen



Selecting Chemicals or Chemical Lists

Select chemicals by name by clicking on *Chemical Name* in the *Search By* area at the top of the screen. The area below *Search By* changes to a *Search By Name* area. You can choose specific chemicals by typing the name of the chemical in the space provided in the empty box in the *Search By Name* area. As you type in the chemical name, the list of available WMPT chemical names appears in the area below the box. Alternatively, you can move up and down through the list of names using the scroll bar located to the right of the list. Click on ▲ to move up one line or click on the shaded area just below the ▲ to page up. Click on ▼ to move down one line or click on the shaded area just above the ▼ to page down. Select a chemical by clicking on the desired chemical name and then clicking on SELECT located to the right. You can also select chemicals by double-clicking on the desired chemical name. After you select a chemical, both the chemical name and CAS number appear in the *Selected Chemicals* area located below the *Search by Name* area. Deselect chemicals by clicking on their CAS number or name in the *Selected Chemicals* area and clicking on DESELECT. You can also deselect a chemical by double-clicking on the CAS number or name.

Select chemicals by CAS number by clicking on *CAS Number* in the *Search By* area at the top of the screen and the area below *Search By* changes to a *Search By CAS* area. You can choose specific CAS numbers by typing the CAS number in the space provided in the empty box located in the *Search By CAS* area. As you type in the CAS number, the list of available WMPT CAS numbers appears in the area below the box. Alternatively, you can move up and down through the CAS number using the scroll bar located to the right of the list. Click on ▲ to move up one line or click on the shaded area just below the ▲ to page up. Click on ▼ to move down one line or click on the shaded area just above the ▼ to page down. Select a CAS number by clicking on the desired number and then clicking SELECT located to the right.

You can also select CAS numbers by double-clicking on the desired number. After you select a CAS number, both the CAS number and the chemical name will appear in the *Selected Chemicals* area located below the *Search by CAS* area. Deselect chemicals by clicking on their CAS number or name in the *Selected Chemicals* area and clicking on DESELECT. You can also deselect chemical by double-clicking on the CAS number or name.

Create a report that includes all chemicals contained in one of a WMPT chemical list by choosing the *Chemical List* option in the *Search By* area at the top of the screen. The area below *Search By* changes to a *Search By List* area. Select a list of chemicals from the available WMPT chemical lists by clicking on the desired list name and then clicking on SELECT. Only one chemical list may be chosen at a time for the Chemical Data Summary Report.

The report format viewed on the screen is the format used to print the report. Refer to section 2.6.1 for information on using report viewing tools. After you have completed viewing, printing, and/or exporting the report data, click on CLOSE button located at the bottom of the viewing screen to return to the system.

2.6.6 Advanced Report Query: Creating a Customized Report

Advanced Report Query or Ad-hoc reporting allows you to define specific output parameters and to create reports for selected WMPT data elements. Use the ad-hoc reporting feature by selecting *Advanced Report Query* from the **Reports** menu. The following three options are available through the Advanced Report Query: *Create a New Report Definition Using the Ad-hoc Wizard; Create a New Report Definition by Writing an SQL Statement*; *Open An Existing Ad-hoc Report Definition*; and *Import a Report Definition*. These options are discussed below.

Creating a New Report Definition Using the Ad-hoc Wizard

If you are unfamiliar with writing SQL code, it is recommended that you use the Ad-hoc Wizard by selecting *Create a New Report Definition Using the Ad-hoc Wizard* from the *Advanced Report Query* screen. The Ad-hoc Wizard guides you through the process of defining the parameters used to generate a report and specifying the desired format. The steps for creating a report using the Ad-hoc Wizard are listed below:

Step 1 - Select Tables
Step 2 - Identify Join Fields (only applicable if more than one table is selected in Step 1)
Step 3 - Select Fields
Step 4 - Define Filters (optional)
Step 5 - Define Sort Order (optional)

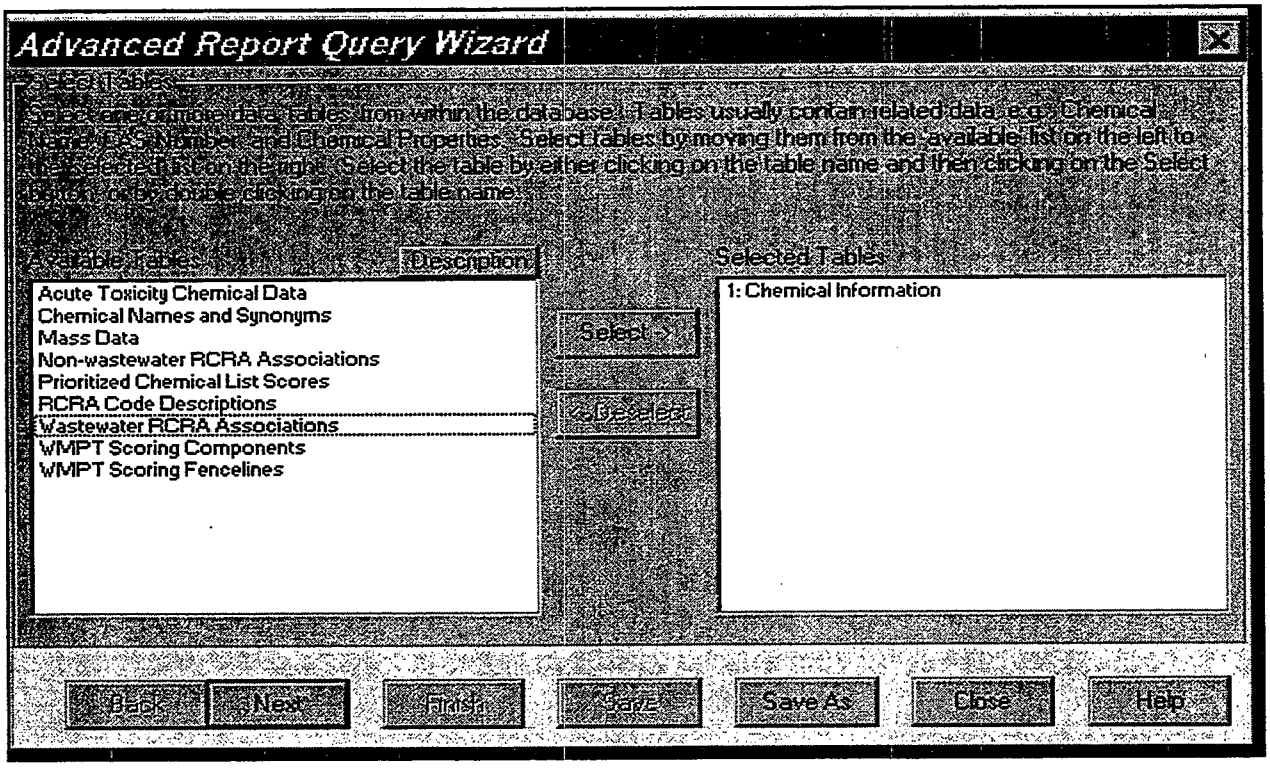
Ad-hoc Wizard Step 1 - Select Tables

The Ad-hoc Wizard *Select Table* screen is shown in Exhibit 2-41. Select one or more data tables from the list located on the left side of the screen. As data tables are selected, their names appear under the *Selected Tables* list located on the right side of the screen and are removed from the *Available Tables* list. Select data tables by:

- Clicking on the name of the data table in the *Available Tables* list and then clicking on SELECT;
- Double-clicking on the name of the data table contained in the *Available Tables* list; or

- Clicking and holding on the name of the data table in the *Available Tables* list and dragging the table into the *Selected Tables* list located on the right side of the screen.

EXHIBIT 2-41
Ad-Hoc Wizard Step 1 - Select Tables Screen



To see a brief description of the contents of the data tables contained in the *Available Tables* list, highlight the data table by clicking on the name and then click on DESCRIPTION located at the top right corner of the list.

You can also deselect tables. As data tables are deselected, their names return to the *Available Tables* list and are removed from the *Selected Tables* list. Deselect data tables by:

- Clicking on the name of the data table in the *Selected Tables* list and then clicking on DESELECT; or
- Double-clicking on the name of the data table contained in the *Selected Tables* list; or
- Clicking and holding on the name of the data table and dragging the table into the *Available Tables* list.

After selecting all of the desired data tables, click on NEXT to advance to the next step. NOTE: The *Next* button is inactive until at least one data table is selected. To end the Ad-hoc Wizard, click on CLOSE.

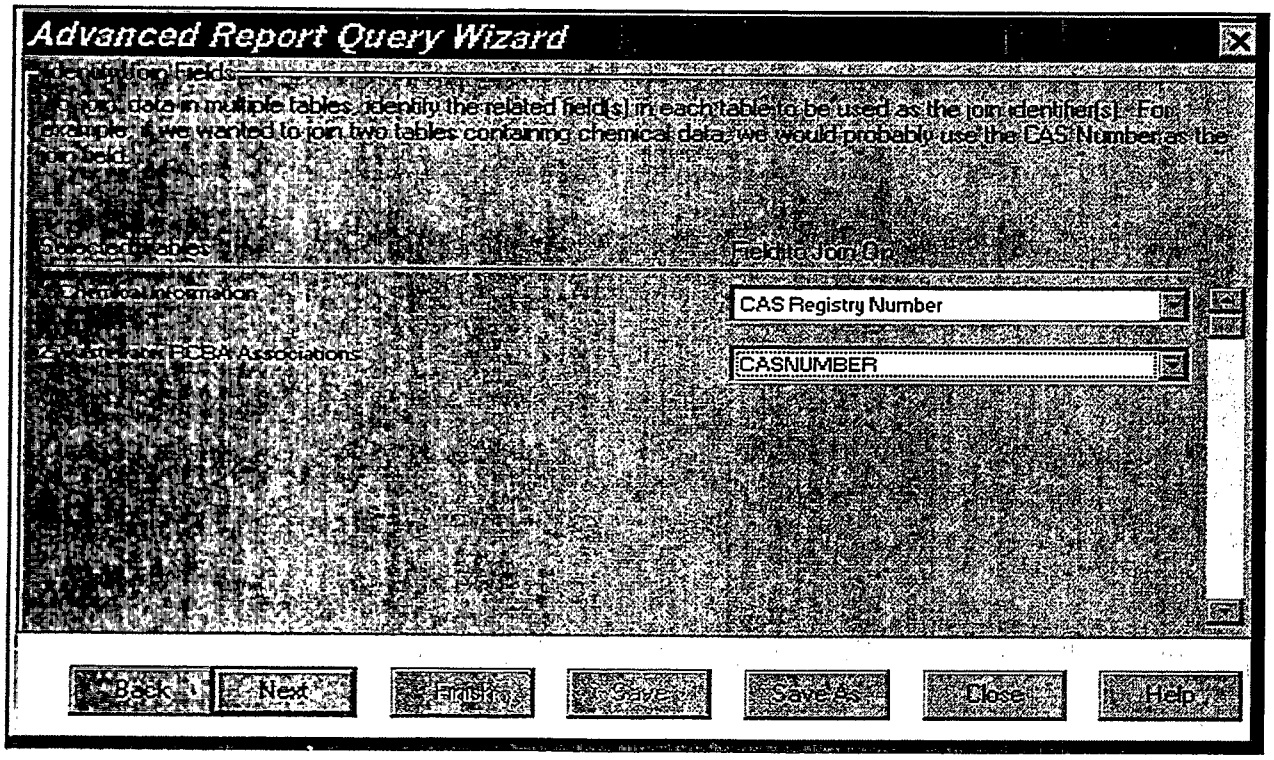
Ad-hoc Wizard Step 2 - Identify Join Fields

This step is required if more than one data table was chosen in Step 1, *Select Tables*. The *Identify Join Fields* step links the data contained in the tables together for the report. NOTE: Some of the tables do not have common join fields and cannot be used together to generate an ad-hoc report. To join tables, you need to identify the common fields found in the selected tables. For example, a data table containing chemical log P data can be joined with another table containing RCRA codes associated with chemicals by selecting the CAS Registry Number field as the join field for both tables. The *Identify Join Fields* screen is shown in Exhibit 2-42.

The data table names selected in Step 1 appear in the *Selected Tables* column on the left side of the screen. Select the join fields for each table from the field lists under the *Field to Join On* column on the right side of the screen. Each list contains the fields available for the selected data table listed to the left. Select the join fields by clicking in the white space to the right of each data table name. The list of fields for that data table appear below the white space. Use the scroll bar to move up and down the list. Click on ▲ to move up one line or click on the shaded area just below the ▲ to page up. Click on ▼ to move down one line or click on the shaded area just above the ▼ to page down. Select the field by clicking on the field name once. The list of available fields disappears and the name of the selected field appears in the box. The join field can be changed by repeating this process.

When a join field has been selected for each data table, click on NEXT to advance to the next step. To end the Ad-hoc Wizard, click on CLOSE.

EXHIBIT 2-42
Ad-Hoc Wizard Step 2 - Identify Join Fields Screen

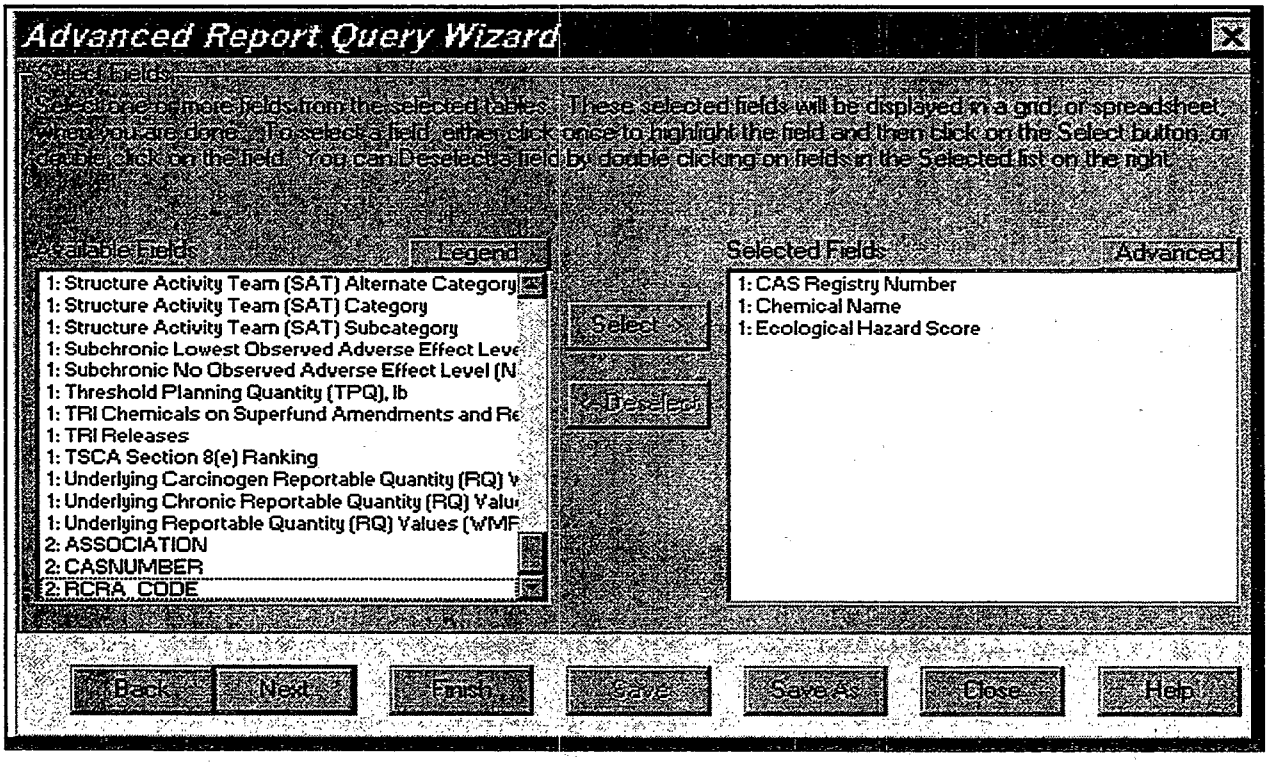


Ad-hoc Wizard Step 3 - Select Fields

The Ad-hoc Wizard *Select Fields* screen is shown in Exhibit 2-43. Select the fields that will be displayed in the finished report from the *Available Fields* list on the left side of the screen. As fields are selected, their names appear under the *Selected Fields* list located on the right side of the screen and are removed from the *Available Fields* list. Select the fields to be included in the report by:

- Clicking on the name of the field in the *Available Fields* list and then clicking on SELECT; or
- Double-clicking on the name of the field contained in the *Available Fields* list; or
- Clicking and holding on the name of the field in the *Available Fields* list and dragging the field into the *Selected Fields* list located on the right side of the screen.

EXHIBIT 2-43
Ad-hoc Wizard Step 3 - Select Fields Screen



The number that appears to the left of each field name in the *Available Fields* list represents the specific data table in which the field can be found. To see which data tables correspond to each number, click on LEGEND, located on the upper right side of the *Available Fields* list.

You can also deselect fields. As fields are deselected, their names return to the *Available Fields* list and are removed from the *Selected Fields* list. Deselect a selected field by:

- Clicking on the name of the field in the *Selected Fields* list and then clicking on DESELECT; or
- Double-clicking on the name of the field contained in the *Selected Fields* list; or

- Clicking and holding on the name of the field and dragging the field into the *Available Fields* list.

By default, the fields appear in the order in which they are chosen. The fields listed from top to bottom on the *Selected Fields* list will appear in order from left to right in the report, respectively. To change the order in which the selected fields will appear in the report, click and hold on the name of the field in the *Selected Fields* list (the pointer will turn into a pointing hand), drag the field name up or down in the list to the desired position, and release. The name of the field appears at the chosen position and disappears from the previous position in the list.

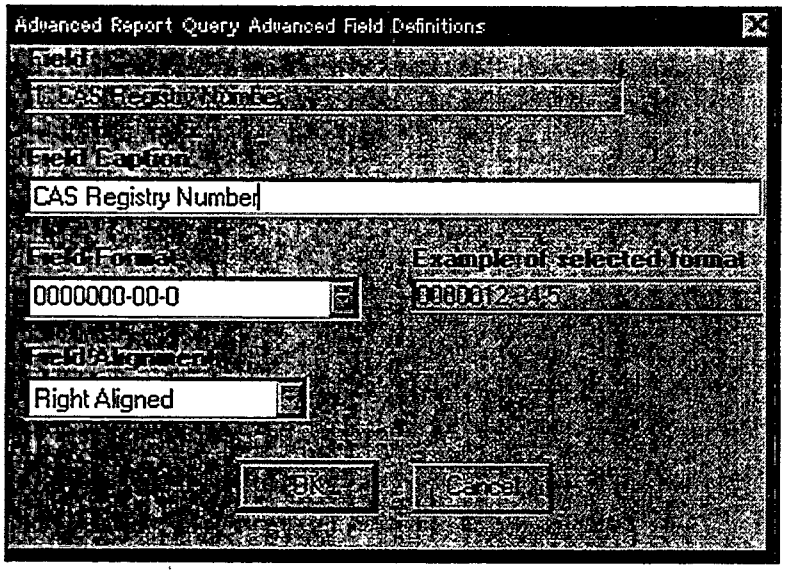
Formatting the Field Appearance

Each field selected to appear in the final report can be individually formatted. Modify a selected field caption, format, and/or alignment by clicking and highlighting a field name in the *Selected Fields* list. Click on ADVANCED located on the top right corner of the *Selected Fields* list. The *Advanced Report Query Advanced Field Options* screen shown in Exhibit 2-44 appears. Each of the advanced field options is discussed below.

Editing the Field Caption

The name of the selected field appears in the *Field* area on the first line of the screen shown in Exhibit 2-44. The name of the field as it will appear in your report can be changed by editing the name in the *Field Caption* area (the default name will be the field description (if any exists) or the field name).

EXHIBIT 2-44
Advanced Field Options Screen



Editing the Field Format

The appearance of the data contained in the selected field can be edited by selecting a format in the *Field Format* area. Select a field format by clicking in the blank space beneath the *Field Format* area. Select a field format by clicking on the format name or code. You can also type your own format into the blank space. An example of how the field data will appear with the chosen format is displayed in the *Example of Selected Format* space.

Editing the Field Alignment

Change the field alignment by selecting one of the alignment options in the *Field Alignment* area. Click on the blank space beneath the *Field Alignment* area to view the available field alignment options. Select *Left Aligned* to line up the field name and data along the left edge of the field column; select *Right Aligned* to line up the field name and data along the right edge of the column; or select *Centered* to center the field name and data in the column.

After completing the desired field format changes, click on OK to return to Step 3 of the Ad-hoc Wizard, *Select Fields*. To return to Step 3 without any changes, click on CANCEL. Note: You can also format report fields from the *Ad-hoc Query Results* screen by clicking the right mouse button and selecting *Change Column Properties* from the menu.

Following selecting, ordering, and formatting of the desired fields, click on NEXT to advance to the next step or click on FINISH to view or print the report, or save it as a file. If you want to save your report definiation thus far, click on SAVE AS. NOTE: The *Next*, *Save As*, and *Finish* buttons are inactive until at least one field is selected. To go back to Step 2, *Identify Join Fields*, click on BACK. To end the Ad-hoc Wizard, click on CLOSE.

Ad-hoc Wizard Step 4 - Define Filters

The optional *Define Filters* step allows you to narrow down the data set used to generate a report. If this step is omitted, all of the data contained in the selected data table will appear in the report. For example, a data table can contain Human Hazard scores for over 4,700 chemicals. By using the *Define Filters* step of the Ad-hoc Wizard, you can filter this data down to only those chemicals having an Ecological Hazard score equal to 3. The *Define Filters* screen is shown in Exhibit 2-45.

All selected fields appear in the *Database Fields* list on the left side of the *Ad-hoc Wizard Step 4* screen. To apply a filter to the data contained in one or more of these fields, build the filter expression into the *Filters* area located at the bottom of the screen. Build the filter expression by:

1. Clicking on the desired field name in the *Database Fields* list;

2. Clicking on INSERT;

3. Clicking on and highlighting the desired operators in the *Operators* list on the right side of the screen; and

4. Clicking on INSERT.

Following these steps builds the expression in the *Filters* screen. Alternatively, the filter expression can be built by double-clicking on the field name and the desired operator. Specific limiters and values must be entered manually by placing your cursor in position in the *Filters* screen and entering the value. Repeat this process until all desired filters are defined.

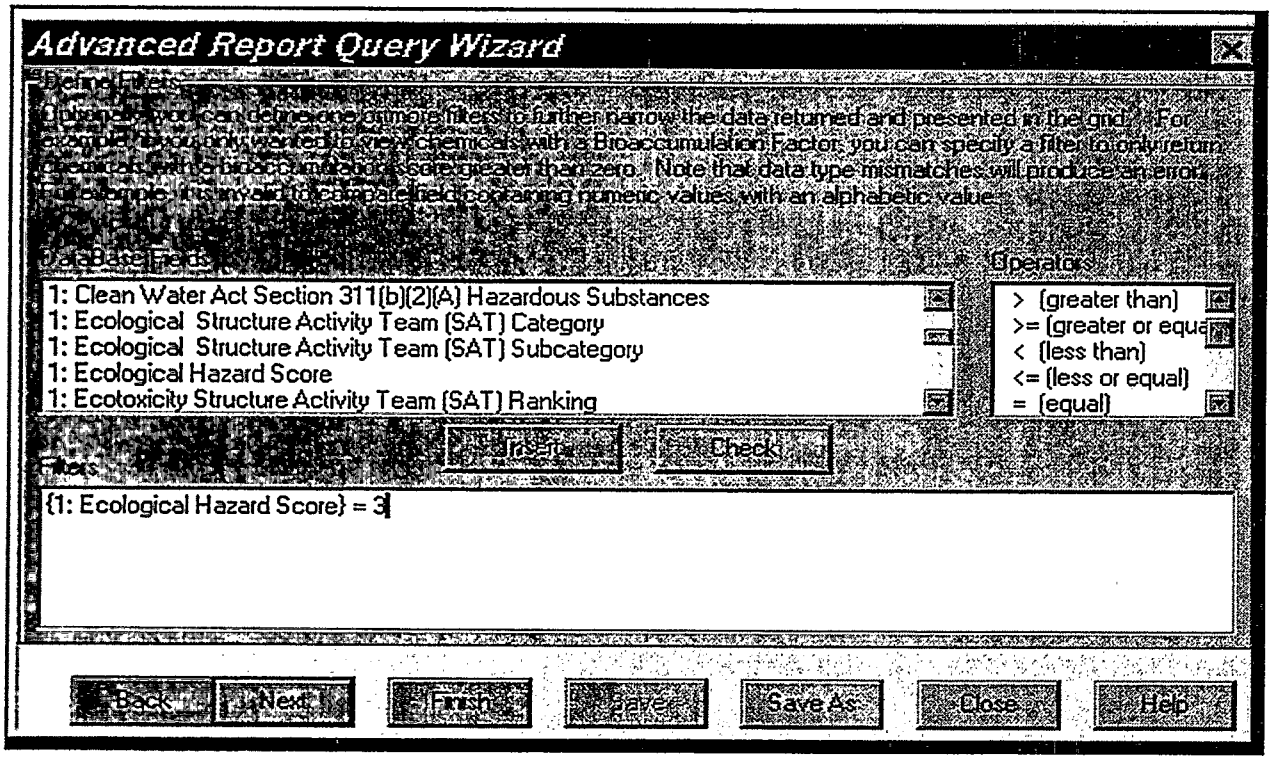
For example, display only chemicals with an Ecological Hazard Score = 3 by:

1. Double-clicking on the Ecological Hazard field name;

2. Double-clicking on the "=" (equal) operator; and

3. Placing the cursor to the right of the "=" (now appearing in the *Filters* screen) and entering the number 3.

EXHIBIT 2-45
Ad-hoc Wizard Step 4 - Define Filters Screen



Check if the filter expression you built is valid by clicking on CHECK. A screen appears indicating whether the expression contains errors or is valid.

After defining all desired filters, click on NEXT to advance to the next step or click on FINISH to view or print the report, or save it as a file. If you saved a report definition in Step 3, you can save it again under the same name by clicking on SAVE (this button will not be enabled if you have not yet saved the report definition). If you have not yet saved the report definition and want to save your work thus far, click on SAVE AS. To go back to Step 3, *Select Fields*, click on BACK. To end the Ad-hoc Wizard, click on CLOSE.

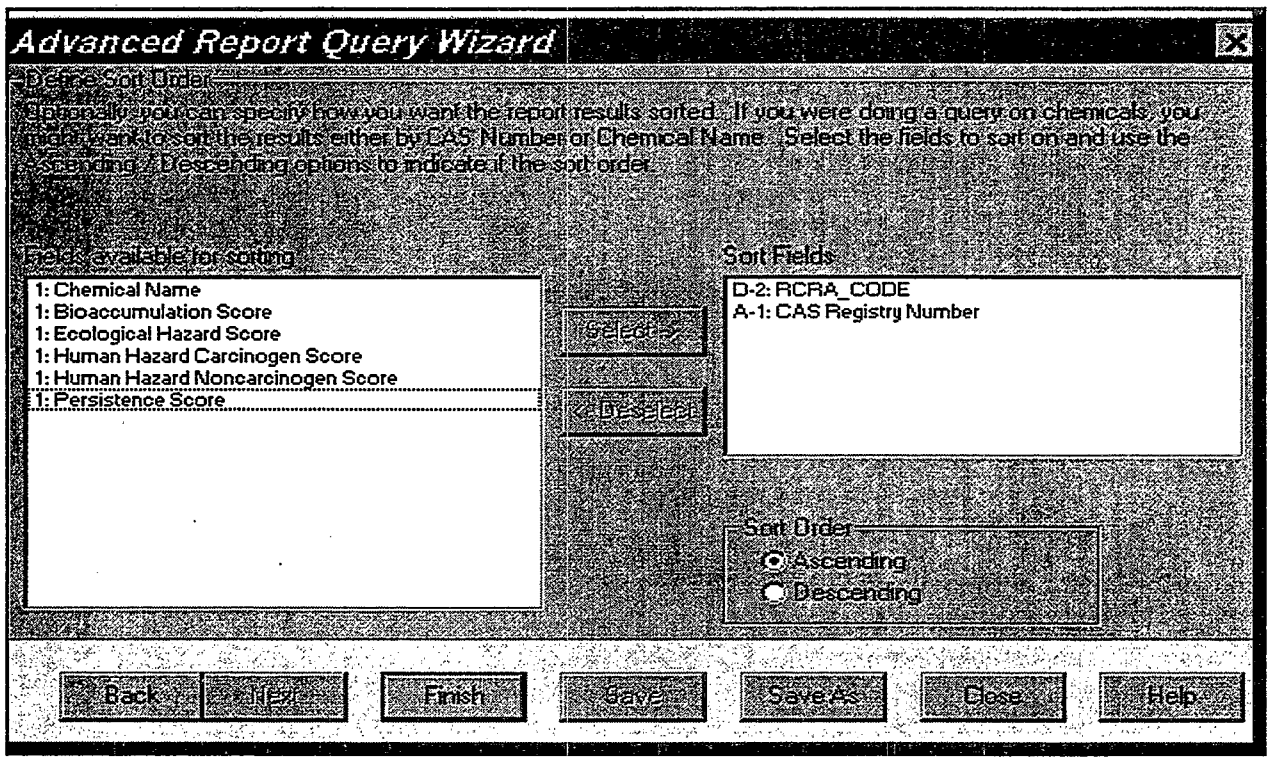
Ad-hoc Wizard Step 5 - Define Sort Order

The optional *Define Sort Order* step allows you to define the order in which the data appears in a report. If this step is omitted, the data will appear on the report in the order it was entered into the data table. The *Define Sort Order* screen is shown in Exhibit 2-46.

Define the sort order of the field by first selecting either *Ascending* or *Descending* from the *Sort Order* box located below the *Sort Fields* list. Next, select the field on which to sort. All of the fields you selected in Step 3 appear in the *Fields available for sorting* list on the left side of the *Ad-hoc Wizard Step 5* screen. As fields are selected for sorting, their names appear under the *Sort Fields* list located on the right side of the screen and are removed from the *Fields available for sorting* list. Select a field to be sorted by:

- Clicking on the name of the field in the *Fields available for sorting* list and then clicking on SELECT; or
- Double-clicking on the name of the field contained in the *Fields available for sorting* list; or
- Clicking and holding on the name of the field in the *Fields available for sorting* list and dragging the field into the *Sort Fields* list located on the right side of the screen.

EXHIBIT 2-46
Ad-hoc Wizard Step 5 - Define Sort Order Screen



You can also deselect fields to removed them from sorting. As fields are deselected, their names return to the *Fields available for sorting* list and are removed from the *Sort Fields* list. Deselect a selected field by:

- Clicking on the name of the field in the *Sort Fields* list and then clicking on DESELECT; or
- Double-clicking on the name of the field contained in the *Sort Fields* list; or
- Clicking and holding on the name of the field and dragging the field into the *Fields available for sorting* list.

To sort on more than one field in the report, first select all sort orders and fields to be sorted. Prioritize the ordering by moving the field names within the *Sort Fields* list so that the first-level sort field appears at the top of the list and the last-level sort field appears at the end of the list, respectively. By default the fields appear in the order in which they are chosen. The fields listed from top to bottom on the *Sort Fields* list will be sorted first to last in the report, respectively. To change the order in which the selected fields will be sorted in the report, click and hold on the name of the field in the *Sort Fields* list (the

pointer changes into a pointing hand), drag the field name up or down in the list to the desired position, and release. The name of the field will then appear at the chosen position and disappear from the previous position in the list.

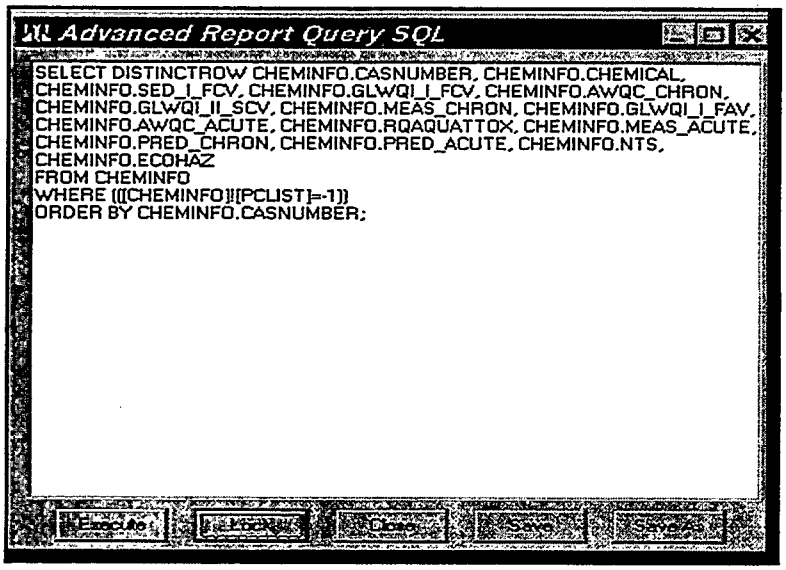
For example, to order the results by descending RCRA code with CAS numbers appearing in ascending order within each group of RCRA codes, set the sort order for the RCRA codes by clicking on the *Descending* option in the *Sort Order* box while the name of the RCRA code field is selected in the *Available Fields* list. Select the RCRA code field. Set the sort order for the CAS number by repeating this process and clicking on the *Ascending* option in the *Sort Order* box and selecting the CAS number field. The RCRA code field should appear above the CAS number field in the *Sort Fields* list. A "D" appears to the left to the RCRA code field name and an "A" appears to the left of the CAS number field name in the Sort Order box, illustrating the respective sort orders.

Click on FINISH to view or print the report, or save it as a file when the sort order is complete. If you saved the report definition in either Steps 3 or 4, you can save it again under the same name by clicking on SAVE (this button will not be enabled if you have not yet saved the report definition). If you have not yet saved the report definition and want to save it for future use, click on SAVE AS. To go back to Step 4, *Define Filters*, click on BACK. End the Ad-hoc Wizard by clicking on CLOSE.

Creating a New Report Definition by Writing an SQL Statement

Create a customized report by writing an SQL statement by selecting *Create a New Report Definition by Writing an SQL Statement* from the *Advanced Report Query* screen. The *Advanced Report Query SQL* screen shown in Exhibit 2-47 appears. Compose the SQL statement by placing the cursor within the blank space of the screen. The SQL code used by WMPT is the same as that used by the MS Access® Database software. An example SQL statement appears in Exhibit 2-47.

EXHIBIT 2-47
Advanced Report Query SQL Screen



When the SQL statement is complete, click on EXECUTE to view or print the report, or save it as a file. Save the SQL for future use by clicking on SAVE AS. To exit the *Advanced Report Query SQL* screen, click on CLOSE. The *Lock/Unlock* and *Save* buttons are discussed in the following section, *Opening and Existing Ad-hoc Report Definition.*

Saving an Ad-hoc Query

To save a query that you created with the Ad-hoc Wizard or with an SQL statement:

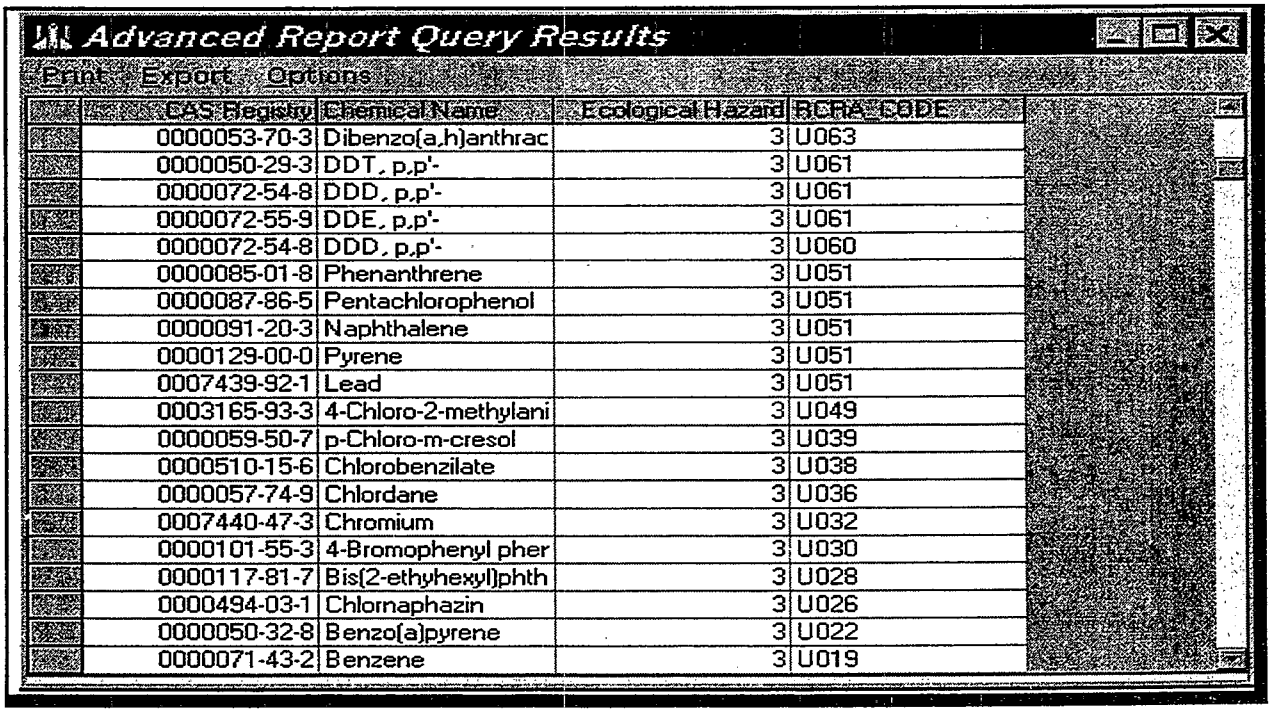
1. Click on SAVE AS at the bottom of the screen;
2. Enter a query description or name in the *Description* area at the top of the *Save As* screen;
3. Choose the type of query format under the *Type* menu in the *Save As* screen; and
4. Click on OK located at the bottom of the *Save As* screen.

Under the *Type* screen, you can choose to save the query as either a normal query or an expert query. A normal query can be retrieved and edited again from within the Ad-hoc Wizard. An expert query is saved as SQL code and cannot be viewed or edited again by the Ad-hoc Wizard. Expert queries can only be edited through their SQL codes. It is recommended that you create queries using the Ad-hoc Wizard and save them as normal queries unless you are experienced in writing SQL code. All saved queries can be retrieved and edited by selecting *Open an Existing Ad-hoc Report Definition* from the *Advanced Report Query* screen. To return to the Ad-hoc Wizard without saving the query, click on CANCEL.

Viewing the Ad-hoc Wizard Query Results

After clicking FINISH or EXECUTE from the Ad-hoc Wizard or Advanced Report Query SQL, respectively, the report that you created appears on your screen. The report display includes all the selected fields as well as all the data contained in each field and reflects the appearance of the report as it will be printed. An example of the *Advanced Report Query Results* screen is shown in Exhibit 2-48.

EXHIBIT 2-48
Advanced Report Query Results Screen



CAS Registry	Chemical Name	Ecological Hazard	RCRA CODE
0000053-70-3	Dibenzo(a,h)anthrac	3	U063
0000050-29-3	DDT, p,p'-	3	U061
0000072-54-8	DDD, p,p'-	3	U061
0000072-55-9	DDE, p,p'-	3	U061
0000072-54-8	DDD, p,p'-	3	U060
0000085-01-8	Phenanthrene	3	U051
0000087-86-5	Pentachlorophenol	3	U051
0000091-20-3	Naphthalene	3	U051
0000129-00-0	Pyrene	3	U051
0007439-92-1	Lead	3	U051
0003165-93-3	4-Chloro-2-methylani	3	U049
0000059-50-7	p-Chloro-m-cresol	3	U039
0000510-15-6	Chlorobenzilate	3	U038
0000057-74-9	Chlordane	3	U036
0007440-47-3	Chromium	3	U032
0000101-55-3	4-Bromophenyl pher	3	U030
0000117-81-7	Bis(2-ethyhexyl)phth	3	U028
0000494-03-1	Chlornaphazin	3	U026
0000050-32-8	Benzo(a)pyrene	3	U022
0000071-43-2	Benzene	3	U019

Changing Column Width

To change the width of any field or column, place your pointer on the line that separates the column (the pointer now appears as a double-ended arrow pointing to the left and right). Click and hold the left mouse button and drag the column line to the left and right to adjust the column size to the desired width.

Formatting, Printing, and Saving the Report

The report display includes the following menus:

- Print;
- Export; and
- Options.

Each of these menus is discussed in the subsections below.

Print

Use the **Print** menu to select and configure a printer destination for the results, as well as send the results to the selected printer. The **Print** menu commands are discussed below:

Printer Setup - Select both the printer to be used to print the report and the desired font from the *Printer Setup* screen. Display printer options by clicking on the displayed printer name or on the down arrow to the right of the displayed printer name. Select a printer by double-clicking on the desired printer name. Display font options by clicking on the displayed font name or on the down arrow to the right of the displayed font name. Select a font by double-clicking on the desired font name. The fonts shown are those that are valid for the selected printer.

Click OK to set the printer/font. Click CANCEL to close the *Printer Setup* screen with no changes.

Print Results - Enter the title for the report under the *Printout Title* area. This title will be displayed at the top of each page of the printed report. Enter the desired number of copies under the *Copies* area. The number of copies can be set by clicking on  or  to the right. You can also key enter the number of copies into the space manually. Set the report orientation by clicking either landscape or portrait in the *Page Orientation* box.

Click OK to print the report. The report will be printed using the printer selected in the *Printer Setup* screen. Click CANCEL to close the *Print Results* screen without printing the report.

Export - To export the results to a CSV file, select **Export**. A *.CSV file is a comma-separated-value file. The contents of a *.CSV file can be converted into either a spreadsheet or database file by most applications. For example, you can import a *.CSV file directly into Excel® and then save it as an Excel® spreadsheet or other format. Enter the desired file name for the CSV file in the *File Name* area. Select the target directory into which the CSV file will be created and saved from the *Folders* box.

Click OK to save the report into the *.CSV file. Click CANCEL to close the *Export to CSV File* screen with no changes.

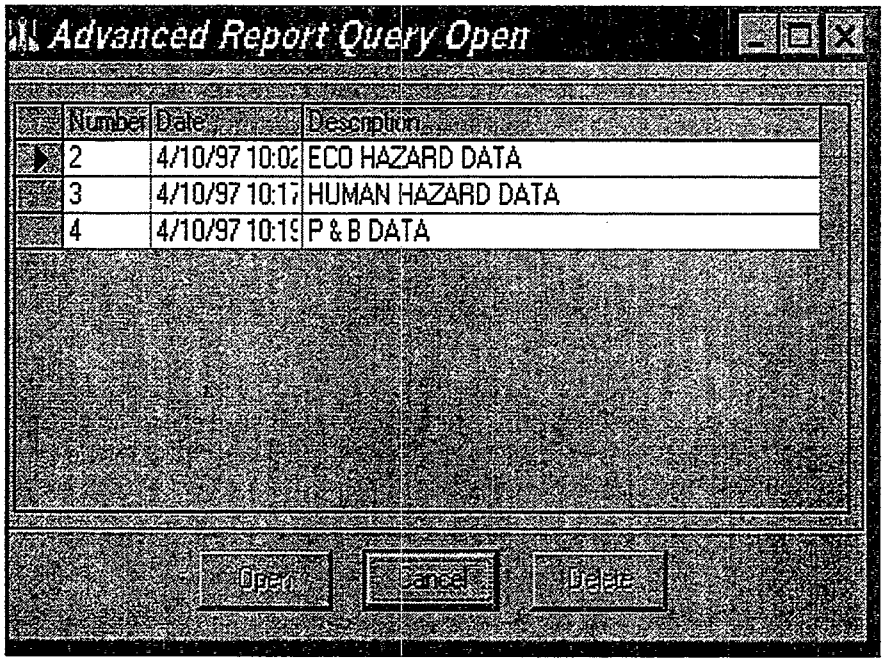
Options - Select **Options**, *Change Column Properties* to change the formatting properties of a column in the report display.

By selecting this option, the *Advanced* screen appears. You can also change the column properties by double-clicking on the desired field/column name shown in Exhibit 2-44. Format the field/column as by entering the necessary information in the *Advanced* screen and clicking on OK to save the formatting. Clicking on CANCEL closes the *Advanced* screen with no changes to the report. For a more detailed description of the components of the *Advanced* screen, refer to *Ad-hoc Wizard Step 3 - Select Fields* provided in this section.

Opening an Existing Ad-hoc Report Definition

Open a query that was created in either the Ad-hoc Wizard or SQL code by selecting *Open an Existing Ad-hoc Report Definition* from the *Advanced Report Query* screen. The *Advanced Report Query Open* screen is shown in Exhibit 2-49. Select a query to open by clicking on one of the query names listed in the *Description* column and clicking OPEN, located at the bottom of the screen. You can also open a query by double clicking on the query name. Delete an existing WMPT query by clicking on the query name and clicking on DELETE. Exit the Advanced Reporting Query without opening a saved query by clicking on CANCEL.

EXHIBIT 2-49
Advanced Report Query Open Screen



If the query you would like to open was saved as a normal query, the Ad-hoc Wizard is enabled and the query can be edited using the Ad-hoc Wizard steps described in *Creating a New Report Definition Using the Ad-hoc Wizard.*

If the query you would like to open was saved as an expert query (i.e., it was saved as an SQL statement), the *Advanced Report Query SQL* screen appears with the SQL code. To edit the code, click on the *Lock/Unlock* button until LOCK is visible. This "unlocks" the code and allows changes to be made and executed. To make the SQL code read-only (i.e., edits cannot be made to the code), click on the *Lock/Unlock* button until UNLOCK is visible. After you complete the changes to the query, click on SAVE to save the query under the same name. Save the query under a new name by clicking SAVE AS. NOTE: Advanced queries can only be saved again as advanced queries.

2.7 HELP SYSTEM (HELP MENU)

Activate the online WMPT Help System by clicking on the **Help** menu and selecting *Contents*. You may then click on the desired Help topic. *NOTE: Only the Ad-hoc Wizard Help topics are currently active.* Other information available through the Help menu includes general information. This feature is discussed below.

2.7.1 About WMPT

Select *About WMPT* from the **Help** menu to display the WMPT version number, copyright, and licensee name (i.e., the name you entered during WMPT installation). Click on OK to return to the WMPT main menu.

2.8 ERROR MESSAGES

In general, WMPT error messages are user friendly and intuitive. In all cases, the error message is intended to explain the error, as well as recommend corrective actions. Note that to avoid the possibility of losing data, it is recommended that you save the CHEMICAL.MDB database periodically if you are modifying data, fencelines, or chemicals. The table shown in Exhibit 2-50 lists the majority of the error messages that can be produced by WMPT, provides a description of each error message, and suggests corrective actions.

EXHIBIT 2-50
WMPT Error Messages

Number/Message	Explanation	Recommended Action(s)
3024	The read-only database, CHEMREAD.ERG, is either missing or corrupt.	Contact Technical Support or reinstall WMPT.
This is an invalid database.	The database you selected is either not a valid WMPT database or it has become corrupted.	If you selected a valid database that has become corrupted, perform the following: (1) repair the database by selecting *Repair Database* from the **File** menu and (2) compress the database by selecting *Compress Database* from the **File** menu.
This command is not available until a file is opened.	You attempted to select an item on the toolbar that requires a database to be opened first.	Open a database file by selecting *Open* from the **File** menu and double clicking on a file name. After you successfully open a database, the file name will appear in the main window title.
The following error (nnn) was encountered while... Please contact Technical Support.	This is the message displayed when an unexpected error is trapped in a general error trapping function.	Inform Technical Support of the error number.
This [name/CAS number] is already being used by [CAS number/name]. Enter a different [name/CAS number].	WMPT chemicals are uniquely identified by CAS number and primary name. Two chemicals in the database can have neither the same CAS number nor the same primary name.	Select a different CAS number or chemical name. If you wish to add a chemical synonym, refer to the *Editing Chemical Synonyms* section for more information.
The selected Chemical was not found in the CHEMINFO table.	The CHEMICAL database contains both a data table (CHEMINFO) and an index table (CHEMICAL). This error indicates that a chemical in the index table does not have a corresponding entry in the data table.	Inform Technical Support of the error.

EXHIBIT 2-50 (Continued)
WMPT Error Messages

Number/Message	Explanation	Recommended Action(s)
Invalid value. EPA list fields must be 'X' or blank.	You entered an invalid value for a chemical while modifying a regulatory list.	Enter either an upper case "X" or leave the field blank. Refer to Section 2.3.1 for more information on editing chemical data.
Invalid value. Valid Metal field values are: 'M', 'MC', 'MSA', 'MSB', 'MIN', or blank.	You attempted to enter an invalid Metal value for a chemical.	Enter a valid value. Refer to Appendix B.2.1 from metal compound codes.
Invalid Weight of Evidence (WOE). Valid WOE values include: A, B, C, D, or blank.	You attempted to enter an invalid WOE for a chemical.	Enter a valid value.
Invalid Distribution. Distribution format it must be 'n:n:n'. Enter a valid distribution and try again.	The fenceline distribution format must be three non-zero integers separated by colons.	Enter a valid fenceline distribution. If you changed your mind about the distribution values, you can re-enter the default of "1:1:1."
Error encountered in deriving Distribution Fencelines. No data found in database. Please contact Technical Support.	You attempted to automatically derive distribution fencelines for a factor without any data in the database.	Check the selected factor to determine if data exists in the database. If so and the error still occurs, contact Technical Support for additional guidance.
An original Fenceline was not found for the selected Fenceline. The Reset operation failed. Please contact Technical Support if you have any questions.	You selected RESET in the *Edit Fencelines* window. The RESET button reinstates the original values for a factor. RESET cannot be used for fencelines you add to WMPT.	Change the factor values manually.

EXHIBIT 2-50 (Continued)
WMPT Error Messages

Number/Message	Explanation	Recommended Action(s)
An invalid fenceline quality was detected in the database. A fenceline's quality is an integer number between 1 and 15. Please contact Technical Support.	The scoring engine detected an invalid fenceline number.	Contact Technical Support.
A fenceline short name is required	You attempted to add a new fenceline, but did not specify a name for the fenceline.	Enter a name for the fenceline. The fenceline name should be something meaningful. It can include embedded blanks, for example, "Consumer Use."
Error adding fenceline. You have exceeded the number of available fencelines. Contact Technical Support.	WMPT allows 30 factors or fencelines per component score, i.e., Ecological Hazard. This message is displayed when you attempt to add the 31st factor.	Delete an existing factor before adding the new factor.
You are not allowed to delete this chemical list. This list is required for WMPT to operate properly.	This message is displayed when you attempt to delete a chemical list that is required in order for WMPT to work properly.	Do not attempt to delete the list.
Embedded blanks are not valid in the list identifier. Please remove any embedded blanks.	List identifiers are fields in the CHEMINFO table that identify which chemicals belong to a list. List identifiers are limited eight characters, and cannot include embedded blanks.	Remove embedded blanks from the list identifier. "Mylist" is an example of a valid list identifier. "My List:" is an example of an invalid list identifier.
You entered an invalid list identifier. Please remove any special characters, such as periods and dashes.	List identifiers are fields in the CHEMINFO table that identify which chemicals belong to a list. List identifiers are limited eight characters, and cannot include most special characters.	Remove special characters from the list identifier. "Mylist" is an example of a valid List Identifier. "$.,-.@" is an example of an invalid list identifier.

EXHIBIT 2-50 (Continued)
WMPT Error Messages

Number/Message	Explanation	Recommended Action(s)
You entered a list identifier that already exists as a field in the WMPT database. Are you sure this is correct? (We recommend that you always specify a new, unique list identifier when adding a chemical list.)	List identifiers are fields in the CHEMINFO table that identify which chemicals belong to a list. It is possible to use an existing field name as a list identifier, but this is not recommended.	Specify a list identifier with a unique field name.
The list identifier is already in use for an existing chemical list. List identifiers must be unique between chemical lists. Please enter a unique list identifier.	List identifiers are fields in the CHEMINFO table that identify which chemicals belong to a list. It is invalid to have two or more lists with the same list identifier.	Specify a list identifier with a unique field name.
An Unknown Database Lock was encountered. Please save, close, and re-open the database before continuing. It is recommended that you add new chemical lists immediately after opening the database, and not after you have made other database changes.	Database locks are used to preserve the contents of a database. Locks are usually set and released automatically by the database engine. Software, such as WMPT, can sometimes accidentally cause a database lock to be set, preventing another action from occurring.	Close and re-open the database.
The selected RCRA code is not associated with any chemicals	The RCRA code you selected as the search criteria is not associated with any WMPT chemicals.	Select a different RCRA code.

EXHIBIT 2-50 (Continued)
WMPT Error Messages

Number/Message	Explanation	Recommended Action(s)
'Type mismatch' error encountered while attempting to execute the generated SQL statement. This is probably due to a filter. It is invalid to compare a numeric field to a non-numeric compare value. You should remove any suspect filters and try again.	It is invalid to compare certain data types with other data types. For example, it is invalid to compare a numeric value to an alphabetic character value.	Remove any filters you added and attempt to run your query again. Once your query runs successfully without the filters, add one filter at a time to determine the offending filter.
'SQL syntax' error encountered while attempting to execute the generated SQL statement. The generated SQL is shown below. Please contact Technical Support. Generated SQL: xxxxxxxxxx	The SQL generated by the Ad Hoc Wizard was invalid.	Print the message (with the offending SQL at the end), and Contact Technical Support.
Invalid Number of Copies.	This message is displayed when you attempt to enter an invalid number of copies on the *Print* window.	Enter a valid numeric value.
Error 3061 encountered while attempting to select the chemicals in the Chemical Group. One possibility for the error is that the field associated with this Chemical Group was deleted from CHEMINFO.	The database engine returned error 3061 while attempting to extract a chemical list from the database. There are several reasons why error 3061 may occur, but the most likely is that the list identifier for the selected chemical list was deleted from the database.	Verify that the chemical list identifier is still in the CHEMINFO table by selecting *Advanced Query Report* from the **Reports** menu and opening the existing query. The list identifier should appear in the *Available Fields* list in the *Ad-hoc Wizard Step 3* window. If the list identifier is still present, contact Technical Support. If the list identifier was deleted, rebuild the list.

EXHIBIT 2-50 (Continued)
WMPT Error Messages

Number/Message	Explanation	Recommended Action(s)
You have changed the width of the window. Before you select any options from the Chemicals Scored Popup Menu, you will be required to calibrate the graphic. Calibrate the graphic by selecting *Calibrate* in the popup menu.	The window that displays the Distribution of Scores is resizable, you can increase or decrease the window size to meet your needs. However, every time you change the width of the distribution of scores window, you must recalibrate to allow WMPT to recognize the location of the columns on the bar graph.	Click once on the graph with the right mouse button. A floating menu appears. From this menu, select *Calibrate* and follow the instructions that appear on the window title.
You must CALIBRATE the graphic before selecting this option.	You selected a menu option that requires that the graphic be calibrated. Calibration allows WMPT to recognize the location of columns on the *Distribution of Chemical Scores* bar graph. If you resize the window, you must calibrate the graphic.	Click once on the graph with the right mouse button. A floating menu appears. From this menu, select *Calibrate* and follow the instructions that appear on the window title. Once the graphic is calibrated, you can select any menu option.
No Chemicals with the selected score were found.	You asked WMPT to display all chemicals with a certain score, but no chemicals were found with that score.	Select a different score.
The SELECT ALL button causes all of the chemicals to be added to the list. You currently have selected nn chemicals. This will take a while. Are you sure you want to Select All chemicals?	The SELECT ALL button can take a relatively long time to complete, depending on how many chemicals are selected. This message is a warning that WMPT may be busy for a while completing this task.	Answer either Yes or No as appropriate.
It is invalid to specify a Boolean Operator without a compare value. Either define both or remove both.	You entered a partial filter. A filter requires both a Boolean operator as well as a compare value.	Enter both or remove both.

EXHIBIT 2-50 (Continued)
WMPT Error Messages

Number/Message	Explanation	Recommended Action(s)
Are you sure you want to delete xxxxxxx?	This message is a confirmation that you are about to delete something.	Answer Yes or No as appropriate.
Invalid numeric amount.	You entered an invalid numeric value into a field that requires a valid numeric value.	Correct or remove the value.
Invalid File Format. The file has been corrupted or it is not a Database Maintenance file!	You attempted to apply database maintenance, but the file you selected is not in the correct format.	Verify that this is the correct file. Contact the person who created the file to determine how it was created. Contact Technical Support if needed.
Error 3315 encountered in modifying a database row. Field xxx is not defined to accept NULLs. Blanks were applied instead.	While applying the database maintenance, the system encountered a field in the database that is defined to not allow NULLs. The database maintenance file indicated that NULLs should be stored in the field.	No actions are required.
Factor xxxx was not found in the database. Contact Technical Support.	A factor required to generate a component score was not found in the database.	Delete the factor from the component by selecting *Edit Fencelines* from the **Edit** menu.
The selected query is invalid. Contact Technical support.	The Advanced Report Query you selected to open is invalid.	Contact Technical Support.
Invalid Score. Scores must be 0, 1, 2, or 3.	Some chemical attributes stored in the database are prescored factors, such as the SAT Rank. The value you entered is invalid.	Enter a valid value.

EXHIBIT 2-50 (Continued)
WMPT Error Messages

Number/Message	Explanation	Recommended Action(s)
Invalid Fenceline number (nnn) found in the database. Fenceline numbers must be an exponential number of 2, (ie. 1, 2, 4, 8, 16, etc). Contact Technical Support.	Fenceline numbers are used in WMPT to keep track of chemical scoring methodology. The scoring engine encountered an invalid number.	Contact Technical Support.
Do you want to save the changes to the database? If you reply 'No', any changes you have made to the database since the last time it was saved will be lost.	You made one or more changes to the database, but did not save the database. You are now closing down WMPT. The system wants to know whether it should apply or cancel the changes you made to the database.	Answer Yes or No as appropriate.
You must specify a different file name.	You specified the same file name for the *Before* and *After* file names on a Repair or Compress Database.	Enter different file names.
There are no database changes to be saved. Command ignored.	You selected the *Save* from the **File** menu, but no changes have been made to the database.	No action required.
The disk is full. Please delete some files and try again.	You asked the system to save the database under a different file name, which creates another copy of the original database. This is often the cause of running out of disk space.	Delete some files and try again.
This database no longer exists. Please select a different file.	You selected a recent file to open from the **File** menu, but the file no longer exists or was renamed.	Select a different file or select *Open* from the **File** menu to specify the new name/location of the database.

EXHIBIT 2-50 (Continued)
WMPT Error Messages

Number/Message	Explanation	Recommended Action(s)
The file C:\WINDOWS\SYSTEM\xxxxx is in use and cannot be installed. Please exit all other applications and retry. Press Ignore to not install the file and then press Abort to cancel the installation.	The install process copies certain window files to your hard drive if the file doesn't already exist on your hard drive or if they are 'older' then the version on the install disk. This message is displayed when a file is in use and cannot be checked to see how 'old' it is.	If one of the three file names listed below appears in the message, it is recommended that you click the IGNORE button: • C:\WINDOWS\SYSTEM\OLE2.DLL • C:\WINDOWS\SYSTEM\STORAGE.DLL • C:\WINDOWS\SYSTEM\COMPOBJ.DLL If the file that appears in the message is not one of these three files, it is recommended that you exit all Windows applications, including any software suite toolbars, and try the install again.

CHAPTER 3
WMPT APPLICATIONS

This chapter presents some potential applications of the WMPT and its outputs, as well as some follow-up activities that can be implemented to promote source reduction and recycling. As with earlier chapters, this discussion of applications will be revised based on comments from WMPT users. U.S. EPA is interested in hearing your comments on potential applications discussed here, as well as your ideas for additional applications. Section 3.1 of this chapter briefly describes two general applications of the tool, based on its core functions, and section 3.2 provides some examples of specific applications and implementation activities for government agencies and industry.

3.1 GENERAL APPLICATIONS OF THE WMPT

The WMPT scores and ranks chemicals based on their persistence, bioaccumulation potential, and toxicity ("PBT") and, if desired, quantity. The rankings can potentially be used directly or along with the *Chemical-RCRA Waste Code Crosswalk*, as discussed below. Industry and government agencies (at the national, regional, state, or local level) could apply the tool in these ways, keeping in mind how the tool was intended to be applied (see Chapter 1).

Identifying Chemicals for Source Reduction and Recycling: PBT scores could be used alone, or with quantities of chemicals contained in waste streams or released to the environment, to select high-priority chemicals for source reduction and/or recycling.

Identifying Hazardous Wastes that May Contain Specific Chemicals: The *Chemical RCRA Waste Code Crosswalk* function of the WMPT can help users identify hazardous waste streams that are likely to contain particular PBT chemicals.[1] The crosswalk associates chemicals with RCRA hazardous waste codes, distinguishing between wastewater and non-wastewater forms of waste (see Appendix F for more details). Using these waste codes, users could then identify waste streams, from the Biennial Reporting System or other sources, that might contain the chemicals. The waste streams could then be further prioritized based on quantity or other factors, as appropriate, to identify source reduction and recycling priorities.

3.2 SPECIFIC APPLICATIONS OF THE WMPT

This section provides some examples of potential applications of the WMPT and follow-up activities that could be undertaken by government and industry to promote source reduction and recycling. In addition, it provides suggestions for linking results from the WMPT with EPA's waste and release databases.

3.2.1 Potential Government Applications and Activities

Government agencies could focus source reduction and recycling activities on high-scoring PBT chemicals and the hazardous wastes that are likely to contain these chemicals. Once priority chemicals and wastes had been identified, government agencies could pursue a variety of activities to achieve reductions

[1] Please note that not all of the approximately 900 chemicals ranked based on PBT on the *Draft Prioritized Chemical List* are included in the crosswalk, since the crosswalk focuses on a smaller universe of about 500 chemicals typically found in RCRA hazardous wastes.

in these chemicals and wastes. Some potential activities include: hosting waste minimization conferences involving generators of specific wastes containing high-scoring PBT chemicals and highlighting processes that have significant potential to reduce the use of these chemicals; launching voluntary programs to reduce high-scoring PBT chemicals in hazardous wastes (possibly focusing on specific industrial sectors); and organizing waste minimization training courses to spread information on substitute chemicals or processes.

For example, EPA plans to use PBT scores, quantities of chemicals in wastes, and frequency of generation to develop a National Waste Minimization Measurement List of priority chemicals for national waste minimization purposes. EPA will track the presence of these chemicals in hazardous wastes against the reduction goals of the Waste Minimization National Plan (e.g., 50% reduction in the presence of the most persistent, bioaccumulative, and toxic chemicals in our nation's hazardous waste by 2005, compared to a baseline of 1991). EPA regions and states could adopt this National Measurement List, modify it based on their existing priorities, or incorporate PBT scores into their own priority-setting processes.

The WMPT could also be used during permitting and corrective action activities to investigate and prioritize waste minimization activities at facilities generating these chemicals on-site. For example, if a state or EPA region were involved in a permitting action for a facility generating hazardous waste containing high-scoring PBT chemicals, the state or EPA region could suggest that the facility explore waste minimization activities designed to reduce the quantities of the PBT chemicals in their hazardous waste or the overall quantity of waste containing the PBT chemicals.

States and EPA regions could also provide information on high-scoring PBT chemicals and waste minimization opportunities for them during the course of facility inspections or site visits and could investigate the appropriateness of Supplemental Environmental Projects involving these chemicals.

3.2.2 Potential Industry Applications and Activities

Individual facilities or companies could use the WMPT, along with their own knowledge about their operations, the chemicals they use, and the wastes they generate, to establish their source reduction and recycling priorities, goals, and activities. Industrial trade associations could use the WMPT, along with their knowledge about their members' operations, to assist their members in selecting priority chemicals, establishing source reduction and recycling goals, and identifying specific waste minimization opportunities and activities. Potential activities could include: identifying chemicals of concern based on PBT scores; using the crosswalk, or their own knowledge, to identify waste streams containing these chemicals; identifying the processes generating these waste streams; and investigating source reduction and recycling opportunities for these processes and waste streams. Such opportunities may include, when feasible, research into effective substitutes that present reduced risk to human health and the environment.

Similarly, if a facility that generates and manages hazardous waste containing high-scoring PBT chemicals is involved in a corrective action, they may want to consider investigating source reduction and recycling opportunities to reduce the quantity of hazardous wastes containing these chemicals.

3.2.3 Use of the WMPT in Conjunction with Other Information Sources

Results from the WMPT could be applied along with information from other EPA databases to identify and refine source reduction and recycling priorities.

The Biennial Reporting System: The WMPT can provide information on PBT scores of chemicals and RCRA waste codes of hazardous wastes that are likely to contain these chemicals. Once these waste codes had been identified, the Biennial Reporting System (BRS) could then provide information on waste streams, both wastewaters and non-wastewaters, containing these chemicals. The BRS can enable users to identify the following:

- specific generators that generate waste streams containing (high-scoring) PBT chemicals;
- facilities that manage waste streams containing PBT chemicals;
- processes that generate waste streams containing PBT chemicals;
- industrial sectors that generate waste streams containing PBT chemicals; and
- quantities of hazardous wastes containing PBT chemicals generated in the United States or in a particular state or EPA region.

The Toxics Release Inventory: Similarly, the Toxics Release Inventory (TRI), when used in conjunction with results from the WMPT, can provide information on:

- specific facilities that release (high-scoring) PBT chemicals;
- facilities that manage PBT chemicals;
- facilities that transfer PBT chemicals for off-site management;
- sectors that release, manage, and transfer PBT chemicals; and
- quantities of chemicals that are released, transferred off-site, and managed in the United States or in a particular state or EPA region.

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GLOSSARY

Aquatic toxicity - the ability of a chemical or chemical mixture to cause an adverse effect in an aquatic ecosystem. Aquatic ecosystems can be freshwater (e.g., pond, river), saltwater (e.g., ocean), or estuarine (e.g., bay).

Aquatic Toxicity Reportable Quantity - quantity of a chemical that must be reported based on the concentration that is lethal to one-half the population of aquatic animals under continuous exposure for 96 hours. Established for chemicals of concern under Section 102 of CERCLA.

Bins - as used in WMPT, categories used in scoring that correspond to "high, "medium," and "low" concern.

Bioaccumulation - the accumulation of chemical substances in living organisms.

Bioaccumulation Factor (BAF) - the ratio of the steady-state concentration of a contaminant in an organism to the steady-state concentration in the ambient environment. Uptake of the contaminant can occur through either food ingestion or direct contact. (U.S. EPA, 1996)

Bioaccumulation Potential subfactor - one of three chemical-specific properties used to score the Human and Ecological Exposure Potential factors. It is the capacity of a chemical to accumulate over time in an organism as a result of uptake from all environmental sources.

Bioconcentration Factor (BCF) - an indicator of the degree to which a chemical residue may accumulate in aquatic organisms relative to the ambient concentration of the chemical in water. It is the ratio of the steady state concentration of a contaminant in an organism to the steady-state concentration in the ambient environment. Uptake of the contaminant occurs through direct contact. (U.S. EPA, 1996)

Biodegradation - decomposition of a substance into more elementary compounds by biological action. (Cohrssen and Covello, 1989)

Cancer Effects subfactor - one of the two subfactors used to score the Human Toxicity factor. The Cancer Effects subfactor addresses a chemical's potential to cause cancer.

Cancer Weight-of-evidence (WOE) - the extent to which the available epidemiologic, animal toxicity, and other biomedical data support the hypothesis that a substance causes cancer in humans. WMPT uses both U.S. EPA WOE and International Agency for Research on Cancer WOE classifications.

CAS Number - a unique number assigned by the Chemical Abstracts Service to identify a chemical. (Cohrssen and Covello, 1989)

Chemical List - a group of selected WMPT chemicals saved under a specific name that can be accessed for viewing/editing and creating reports. WMPT users can create and save chemical lists.

Chemical Category Human Toxicity Rank - the rank for each chemical based on the Structure-activity Team chemical category.

Chemical synonym - alternative chemical name for the same chemical.

Chemical-RCRA Waste Code Cross-walk - a component of WMPT that designates possible associations between several hundred Resource Conservation and Recovery Act (RCRA) chemicals and RCRA hazardous waste codes.

Chronic Lowest Observed Adverse Effects Level (Chronic LOAEL) - the lowest doses in an experimental study at which a statistically- or biologically-significant adverse effect is seen in an organism after exposure to an altered environment during a major portion of its lifetime.

Chronic No Observed Adverse Effects Level (Chronic NOAEL) - the highest experimental dose at which there is no statistically significant increase in a toxicologically important effect in an organism after exposure to an altered environment during a major portion of its lifetime.

Chronic toxicity - delayed or long-term toxicity. It may also refer to effects that persist over a long period of time whether they occur immediately or are delayed. (U.S. EPA, 1992b)

Column - vertical arrangement of data from a specific field within a data table.

Community - an assemblage of populations of different species within a specified location in space and time. (U.S. EPA, 1992a)

Criterion Maximum Concentration (CMC) - a U.S. EPA aquatic toxicity measure that is an estimate of the highest 1-hour average chemical concentration in water that should not result in "unacceptable effects on aquatic organisms and their uses."

Dose - a measure of exposure. Examples include (1) the amount of a chemical ingested, (2) the amount of a chemical absorbed, and (3) the product of ambient exposure concentration and the duration of exposure. (Suter, 1993)

Ecological Exposure Potential factor - a WMPT scoring factor that addresses chemical exposure to ecosystems. It is scored using three chemical-specific properties: (1) persistence, (2) bioaccumulation potential, and (3) mass.

Ecological receptors - an ecological organism that receives, may receive, or has received environmental exposure to a substance. (Cohrssen and Covello, 1989)

Ecological Risk Potential - the WMPT score that indicates ecological risk. It is the sum of the Ecological Exposure Potential factor and the Ecological Toxicity factor.

Ecological Toxicity factor - a WMPT scoring factor that addresses the potential for a chemical to cause adverse effects on ecosystems. The Ecological Toxicity factor score is added to the Ecological Exposure Potential factor score to generate the Ecological Risk Potential score. Currently, the Ecological Toxicity factor is scored based on only one subfactor, aquatic toxicity.

Ecosystem - the biotic community and abiotic environment within a specified location in space and time. (U.S. EPA, 1992a)

Exposure - measure of potential contact with a chemical or physical agent. In WMPT, exposure is based on a combination of mass, persistence and bioaccumulation scores.

Exposure potential - the potential for contact with a chemical.

Fenceline - thresholds against which WMPT data element values are compared to assign a high, medium, or low score for a particular data element.

Field - an element of a data table that contains a specific item of information, such as CAS number.

Filter - a set of criteria applied to records with a data table in order to return or display a subset of the records or to sort the records.

Final Acute Value (FAV) - a U.S. EPA aquatic toxicity measure that is calculated using one of the following two methods: (1) the estimated concentration of a chemical in water corresponding to the lower 95th percentile of all of the measured acute values that have been conducted for the chemical, or (2) the mean acute value for commercially or recreationally important species.

Final Chronic Value (FCV) - a U.S. EPA-derived measure of the highest four-day average concentration of a chemical in water that should not cause unacceptable toxicity to fish and aquatic invertebrates during a long-term exposure. FCVs are used by U.S. EPA to derive National Sediment Quality Criteria (SQC), Great Lakes Water Quality Initiative (GLWQI) Tier I aquatic life criteria and Chronic Ambient Water Quality Criteria (AWQC).

Geometric Mean Maximum Allowable Toxicant Concentration (GMATC) - geometric mean of the lowest observed effect concentration (LOEC) and the no observed effect concentration (NOEC) for the most sensitive aquatic species.

Government Performance and Results Act (GPRA) - Enacted in 1993, this act places new management expectations and requirements on federal agencies by creating a framework for more effective planning, budgeting, program evaluation, and fiscal accountability of federal programs. The intent is to improve public confidence in federal agency performance by holding agencies accountable for achieving program results. (U.S. EPA, 1997)

Great Lakes Water Quality Initiative (GLWQI) Tier I Final Acute Value (FAV) - an acute aquatic toxicity measure developed from a Tier I methodology similar to that of the National Ambient Water Quality Criteria (AWQC).

Great Lakes Water Quality Initiative (GLWQI) Tier I Final Chronic Value (FCV) - a chronic aquatic toxicity measure developed from a Tier I methodology similar to that of the National Ambient Water Quality Criteria (AWQC).

Great Lakes Water Quality Initiative (GLWQI) Tier II Secondary Chronic Value (SCV) - a chronic aquatic toxicity measure developed based on the GLWQI Tier I and the National Ambient Water Quality Criteria (AWQC) final chronic values (FCVs). Tier II FCVs (i.e., the SCVs) have a less stringent minimum data set than the Tier I FCVs.

Hazard - measure of the inherent toxicological properties of a chemical. As often used, this term can also encompass inherent properties indicating the potential for exposure.

Human Exposure Potential factor - a WMPT scoring factor that addresses chemical exposure to human receptors. It is scored using three chemical-specific subfactors: (1) persistence, (2) bioaccumulation potential, and (3) mass.

Human Health Risk Potential - the scoring element in WMPT that is the sum of the Human Exposure Potential factor and the Human Toxicity factor. The Human Health Risk Potential score is added to the Ecological Risk Potential score to generate the overall chemical score.

Human receptor - a human that receives, may receive, or has received exposure to a substance. (Cohrssen and Covello, 1989)

Human Toxicity factor - a WMPT scoring factor that evaluates chronic adverse effects to human health. Human Toxicity is scored using two subfactors: (1) cancer effects, and (2) noncancer effects.

Hydrolysis - a chemical reaction in which water reacts with another chemical to form two or more new chemicals. (Cohrssen and Covello, 1989)

Isomer - two or more compounds with the same molecular formula, but different arrangements of atoms. (Kotz and Purcell, 1987)

List Identifier - a field created in a WMPT data table that contains 'yes' or 'no' flags indicating a chemical's membership in a specific chemical list.

Log P or Log K_{ow} - the calculated value of the logarithm of the n-octanol/water partition coefficient which represents the ratio between the chemical solubility in polar and nonpolar substances. Predictor of tendency of chemicals to bioaccumulate in fatty tissues.

Lowest Observed Effect Concentration (LOEC) - the lowest concentration of a substance evaluated in an aquatic toxicity test that has a statistically significant adverse effect on the exposed organisms compared with control organisms in a control.

Mass - the amount or quantity of a chemical (e.g., in a waste stream).

Mass subfactor - one of the three subfactors used to score the Human Exposure Potential factor and the Ecological Exposure Potential factor. It evaluates the amount or quantity of a chemical (e.g., in a waste stream) that is available for release to the environment. The mass of a chemical in a waste stream is used as an indicator of the magnitude of exposure that could potentially occur once the chemical is released to the environment.

Median Effects Concentration (EC_{50}) - the concentration of a substance to which test organisms are exposed that is estimated to be effective in producing some sublethal response (e.g., behavioral effects) in 50 percent of the test population. The EC_{50} is usually expressed as some time-dependent value (e.g., 24-hour EC_{50}). (U.S. EPA, 1996)

Median Lethal Concentration (LC_{50}) - a statistically or graphically estimated concentration that is expected to be lethal to 50 percent of a group of organisms under specified conditions. (U.S. EPA, 1992a)

National Waste Minimization Measurement List - list of chemicals derived based on PBT scores and other criteria that will be used by OSW to track progress toward the reduction goals in the Waste Minimization National Plan and EPA's objectives under the Government Performance and Results Act.

No Observed Effect Concentration (NOEC) - the highest concentration of a substance evaluated in an aquatic toxicity test that causes no statistically significant difference in effect compared with the controls.

Non-biological degradation - breakdown of a compound into simpler compounds by non-biological means, such as chemical reaction. (Cohrssen and Covello, 1989)

Noncancer Effects subfactor - one of two chemical-specific properties used to score the Human Toxicity factor. It is assigned a score based on toxicity measures that indicate a chemical's potential to cause chronic noncancer effects.

Non-linear Biodegradation Model - predicts the estimated probability of rapid biodegradation based on a binary model developed considering the biodegradation rates of 264 chemicals. The binary model was constructed using 35 chemical structures, determining the contribution of each of these structures to the degradation rate. The model predicts the probability that a particular chemical will be a rapid or a slow degrader.

Non-wastewaters - wastes that do not meet the criteria for wastewaters. The criteria for wastewaters are the presence of less than one percent by weight total organic carbon (TOC) and the presence of less than one percent by weight total suspended solids (TSS).

Octanol-water partition coefficient (K_{ow}) - a measure that indicates the extent of chemical partitioning between water and octanol at equilibrium. A greater K_{ow} indicates that a chemical is more likely to partition to octanol than to remain in water. Octanol is used as a surrogate for lipids (fat), and chemical's K_{ow} can be used to predict bioconcentration of that chemical in aquatic organisms. (U.S. EPA, 1989)

Persistence - the tendency of a chemical to remain in the environment without transformation or breakdown into another chemical form (e.g., to require relatively long periods of time to be degraded by microorganisms and/or by chemical processes). Persistence indicates how long a chemical is expected to exist in the environment and, thus, be available for exposure.

Persistence subfactor - one of three chemical-specific properties used to score the Human and Ecological Exposure Potential factors. As used in WMPT, it indicates the time required for a chemical to completely biodegrade in the environment using the estimated biodegradation time from the ultimate survey model and the estimated probability of rapid biodegradation from the non-linear model, and adjusted based on measured biodegradation rates, predicted hydrolysis rates, and (where appropriate) metal category.

Photolysis - chemical decomposition induced by light. (Cohrssen and Covello, 1989)

Population - an aggregate of individuals of a species within a specified location in space and time. (U.S. EPA, 1992a)

Prioritized Chemical List (PCL) - a draft relative ranking of 879 chemicals out of 4,700 included in WMPT that have data for persistence, bioaccumulation, and toxicity.

RCRA Hazardous Waste Code - a label placed on a certain type of statutorily defined hazardous waste. A waste code can define waste that contains a certain chemical or define waste that comes from a certain industrial process. If a waste qualifies for a waste code, then it is considered hazardous under RCRA.

Record - a unit of storage in a data table comprised of data fields.

Reference Concentration (RfC) - an EPA estimate of the highest inhaled air concentration exposure for the human population likely to be without appreciable risk of deleterious effects during a lifetime.

Reference Dose (RfD) - an EPA estimate of the highest daily exposure by ingestion to the human population, including sensitive subgroups, that is likely to be without appreciable risk of deleterious effects during a lifetime.

Reportable Quantity (RQ) - the quantity of a hazardous substance above which if released the chemical must be reported under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA).

Risk - the probability that a substance will cause adverse effects to human health or the environment under specified conditions. Risk is dependent on exposure potential and toxicity.

Risk assessment paradigm - the generally accepted method of measuring risk, which establishes a generalized risk calculation equation that denotes a multiplicative relationship between exposure and toxicity (i.e., Individual Risk = Toxicity × Exposure).

Row - a set of data belonging to a record arranged in a horizontal formation within a data table, each member of the row belonging to a field within that data table.

Secondary Chronic Value (SCV) - a U.S. EPA aquatic toxicity measure that is the estimated average concentration of a chemical in water that should not result in "unacceptable adverse effects" on aquatic organisms exposed for long-term durations (i.e., greater than four days). SCVs are derived based on the GLWQI Tier II methodology, which has even less rigorous data requirements than the GLWQI Tier I methodology used to calculate FCVs.

Slope Factor (q*) - the upper-bound linear term from EPA's model of the dose-response function for carcinogens. The slope factor is used to estimate an upper-bound probability of an individual developing cancer as a result of a lifetime of exposure to a particular level of a potential carcinogen. The higher the slope factor value, the higher the carcinogenic potency. (U.S. EPA, 1989)

Structure-activity Relationship (SAR) - relationships of biological activity or toxicity of a chemical to its chemical structure or substructure. (Sullivan, 1993)

Structure-activity Team Chemical Category - the SAT chemical category system contains both major categories and subcategories for many chemicals. Descriptive categories, such as aldehydes or esters, were developed by EPA based on either structure or function of chemicals. Over 150 categories based on the SAT rankings of over 1,400 chemicals have been developed. A chemical with no SAT ranking can be "assigned to" an SAT chemical category based on its structure or function. A human health hazard rank for that chemical is then derived from the rankings of all SAT ranked chemicals in that chemical category.

Subchronic Lowest Observed Adverse Effects Level (Subchronic LOAEL) - the lowest dose in an experimental study at which a statistically - or biologically-significant adverse effect is seen in an organism after exposure to an altered environment over about 10 percent of its lifetime.

Subchronic No Observed Adverse Effects Level (Subchronic NOAEL) - the highest experimental dose at which there is no statistically significant increase in a toxicologically important effect in an organism after exposure to an altered environment over about 10 percent of its lifetime.

Threshold Planning Quantity (TPQ) - the amount of an extremely hazardous substance present at a facility above which the facility's owner/operator must give emergency planning notification to the State

Emergency Response Commissions (SERVCs) and Local Emergency Planning Commissions (LEPCs) under SARA Section 302.

Toxicity - a measure of the potential for a chemical to cause adverse effects to living organisms or the ecological systems. Also, the quality or degree of being poisonous or harmful to plant, animal, or human life. (Cohrssen and Covello, 1989)

Ultimate Survey Model - predicts the estimated time for complete biodegradation of a chemical based on the results of a survey of fifty experts who ranked 200 organic chemicals on their environmental persistence.

Use Clusters Scoring System (UCSS) - a screening tool developed by the Office of Pollution Prevention and Toxics (OPPT) that provides a screening-level scoring/ranking of chemicals based on the potential exposure, potential hazard, and EPA interest. It identifies "use clusters" of chemicals (i.e., groups of chemicals that may substitute for one-another in a given use) that may have high potential for pollution prevention. (U.S. EPA, 1994)

Waste Minimization National Plan (WMNP) - released in November 1994, sets the following goals for voluntary national reductions in the most persistent, bioaccumulative, and toxic chemicals in hazardous wastes: 25 percent reduction by the year 2000; 50 percent reduction by the year 2005. One of the stated objectives of the Plan is to develop and distribute tools that stakeholders can use to identify their source reduction and recycling priorities. U.S. EPA's Office of Solid Waste (OSW), working in partnership with U.S. EPA's Office of Pollution Prevention and Toxics (OPPT) designed WMPT to assist in meeting this objective.

Wastewaters - wastes that contain less than one percent by weight total organic carbon (TOC) and less than one percent by weight total suspended solids (TSS).

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APPENDIX A
THE WMPT SCORING APPROACH

This appendix presents the Waste Minimization Prioritization Tool (WMPT) chemical scoring approach and its foundation. Section A.1 introduces the current theory and practice of risk screening for chemicals that form the foundation for the WMPT. Section A.2 presents the risk assessment paradigm and how it relates to the structure of the WMPT. Section A.3 describes the scoring algorithm and provides an overview of the factors, subfactors, and data elements used in the WMPT. Section A.4 explains the scoring scales for the subfactors in the WMPT. Section A.5 discusses the WMPT data quality hierarchies. Finally, section A.6 discusses the limitations associated with the WMPT scoring approach.

A.1 INTRODUCTION

The WMPT scoring approach is consistent with the theory and practice currently used in many risk-screening tools. There are many tools of various types that can be considered risk-screening tools. Risk-screening tools are essentially priority-setting applications of risk assessment that involve some kind of ordering of the items (e.g., chemicals), either by scoring and ranking them individually or placing them in ordered groups (e.g., high, medium, low). While some of these tools may incorporate site-specific information, such information generally is used in a different way and to a lesser extent than in actual site- or chemical-specific risk assessments. Risk-screening or priority-setting tools emphasize the comparative aspects of risk assessment—that is, the "relative risks" of two or more items, in contrast to their "absolute risks," which are considerably more difficult and costly to estimate given current methods and the types of data generally available.

Risk-screening tools typically incorporate major simplifying assumptions, simple models of physical, chemical, and biological processes, and default values for many input variables. In fact, most chemical risk-screening tools are based primarily, or even exclusively, on selected risk assessment parameters, such as toxicity and other inherent properties of chemicals (e.g., bioaccumulation potential). Because of their key role as determinants of human health and environmental risks, criteria related to a chemical's persistence (P), bioaccumulation potential (B), toxicity (T), and mass (M) are among the most important and frequently used criteria in priority-setting systems or risk-screening tools that address chemicals.

Although there are important commonalities across many of the tools, as discussed above, there also are many variations in design, screening criteria considered, criteria evaluation methods, algorithms for combining scores, relative "weighting" of criteria, and rules for data use. Typically, a tool is developed and applied for a specific use and is not considered directly transferable to other uses; that is, there is no universally accepted risk-screening or ranking tool for chemicals, or wastes, or other similar items.

Given the lack of a consensus risk screening approach for chemicals that could be readily applied to identify waste minimization priorities, U.S. EPA developed an approach built as much as possible on generally accepted scientific theory and practice. This approach:

- Focuses on the key P, B, T, and mass criteria often used in risk screening;
- Scores these criteria as consistently as possible with approaches used in other Agency programs; and

- Aggregates scores for these criteria by following the theoretical construct of the risk assessment paradigm.

This appendix spells out the details of this approach.

It is important to note here that although WMPT follows the risk assessment paradigm, its scoring approach does not constitute a standard risk assessment as commonly understood. The WMPT scoring approach is a screening-level method, where a limited number of indicators of risk are evaluated and readily available data are used. The scoring algorithm is not intended to be used as a substitute for detailed risk assessment.

A.2 CONSISTENCY WITH THE RISK ASSESSMENT PARADIGM

The risk assessment paradigm states that individual risk is a function of toxicity (T) and exposure (E).[1] This statement yields a generalized risk calculation equation where risk can be regarded as a multiplicative function of toxicity and exposure. The WMPT scoring algorithm is designed to be consistent with this risk calculation equation:

$$\text{Individual Risk} = \text{Toxicity} \times \text{Exposure} \quad (\text{or } T \times E) \qquad [1]$$

See the accompanying box for definitions of these terms.

Toxicity-related factors measure the potential for the chemical or waste to cause adverse effects to human and ecological receptors in the event of exposure, as well as the nature and severity of the adverse effects. Toxicity factors are often based on the relationship between the administered dose of a chemical and the incidence of adverse effects observed in the exposed population (i.e., a dose-response relationship).

Exposure-related factors that are a function of chemical properties include the following:

- The likelihood and magnitude of potential or actual release of a chemical to the environment (e.g., the amount of chemical available for release, the chemical's rate of release).

- The potential for the chemical to be transported to receptors (e.g., the chemical's soil-to-water partition coefficient).

Risk, Toxicity, and Exposure

Risk is defined as the likelihood that a substance will cause adverse effects to human health or the environment under specified conditions. Risk is dependent on exposure potential and toxicity.

Toxicity is defined as the tendency of a chemical to produce adverse effects in organisms following exposure. Toxicity indicates, for a given exposure level, whether adverse effects might be expected and, if so, what kinds of effects can occur and how severe/reversible they might be.

Exposure is defined as contact of an organism with a chemical, and generally refers to the amount of the chemical available for uptake at the organism's exchange boundaries (e.g., skin, lungs).

[1] The risk assessment paradigm conveys the conceptual relationship between several factors or phases that in combination lead to risk; this concept has been formally described in the National Research Council's (NRC) 1983 publication, *Risk Assessment in the Federal Government: Managing the Process.*

- The potential for the chemical to persist in the environment (e.g., the chemical's biodegradation rate).

- The potential for the chemical to accumulate in plant and animal tissue (e.g., the chemical's bioconcentration factor).

Other exposure factors not related to the chemical (e.g., size and location of exposed populations, duration of exposure) are also important considerations in risk assessments. As a screening-level tool, however, WMPT addresses only selected chemical-specific indicators of exposure.

The WMPT scoring approach uses the basic risk calculation equation to derive a measure of a chemical's "risk potential." The final output of the WMPT scoring approach is an overall chemical score that integrates two separate risk potential scores, each of which is derived consistent with the risk calculation equation. The two risk potential scores in the WMPT are derived, using Equation 1, as follows:

$$\text{Human Health Risk Potential} = \text{Human T} \times \text{Human E} \quad [2]$$

$$\text{Ecological Risk Potential} = \text{Ecological T} \times \text{Ecological E} \quad [3]$$

In more detailed and comprehensive risk assessments, additional measures of toxicity and exposure are used to assess different kinds of risks (e.g., cancer, noncancer, occupational) and to assess risks more precisely. The general equations can be expanded to include many more terms and become much more complicated, especially the exposure component.

In contrast, in screening-level tools such as WMPT, a small number of relatively simple measures are used to represent toxicity and exposure. In WMPT, the toxicity "factor" is represented by one "subfactor" each for human and ecological toxicity, which is based on the dose-response characteristics of a chemical for particular effect types. (The human toxicity subfactor is the higher of the cancer and noncancer effects subfactors.)

The exposure factor, for both human health risk potential and ecological risk potential, is represented by three "subfactors:"

- Mass (M), which is based on the amount of a chemical generated and potentially releasable to environmental media, and thus potentially available as a source of environmental exposure;

- Environmental persistence (P), which is based primarily on the overall rate of biodegradation of a chemical in the environment; and

- Bioaccumulation potential (B), which is based on the equilibrium partitioning of a chemical from environmental media (e.g., water) to biota (e.g., fish).

The scoring of these individual factors, and the algorithm used to combine individual factor scores into overall scores, are based on the logic and relationships contained in the risk assessment paradigm, and, more specifically, the generalized risk calculation equation. The subfactors representing exposure are combined in a multiplicative fashion based on the relationships among these types of criteria in standard fate and transport equations used to estimate exposure concentrations. Thus, for purposes of this scoring system, Equations 2 and 3 become:

$$\text{Human Health Risk Potential} = \text{Human T} \times (\text{M} \times \text{P} \times \text{B}) \quad [4]$$

$$\text{Ecological Risk Potential} = \text{Ecological T} \times (\text{M} \times \text{P} \times \text{B}) \quad [5]$$

In a detailed risk assessment, when risks of human chronic exposures are being assessed, exposure is often represented as an average (over a specified time period) chemical concentration in the environmental medium (e.g., air, food, water) to which a person is being/would be exposed. In a screening-level system such as WMPT, potentially releasable mass (represented by pounds of a chemical generated or released) is used as a relatively crude, but widely available, surrogate for potential exposure concentration. Persistence and bioaccumulation potential are used as "modifiers" of the mass to reflect the way in which these physical/chemical characteristics affect a chemical's potential exposure concentration. Persistence (represented by time required to biodegrade) is used to increase any score that reflects risk potential, consistent with the way a chemical's resistance to degradation increases its long-term exposure potential. Bioaccumulation potential (represented by bioconcentration factor, bioaccumulation factor, or n-octanol-water coefficient (K_{ow})) is also used to increase any score that reflects risk potential, consistent with the amplification of concentration of bioaccumulating chemicals in biological systems, and thus the increased exposure potential via food chain pathways.

The underlying data used to score all four subfactors included in the WMPT scoring approach (i.e., T, M, P, and B) all vary over ranges of a number of orders of magnitude. The scoring scales, therefore, can be roughly approximated by a logarithmic scale. For example, instead of presenting scores ranging from 10 to 1,000,000, log values ranging from 1 to 6 would be used.[2] When scoring Equations 4 and 5 are converted to log values, the T, M, P, and B subfactors are added rather than multiplied (to maintain mathematical consistency), yielding the following equations:

$$\text{Score for Human Health Risk Potential} = \text{Scores for Human T} + (\text{M} + \text{P} + \text{B}) \quad [6]$$

$$\text{Score for Ecological Risk Potential} = \text{Scores for Ecological T} + (\text{M} + \text{P} + \text{B}) \quad [7]$$

Equations 6 and 7 form the essential construct of the overall WMPT scoring algorithm; the specific factors, underlying data, and scoring and aggregation approaches are discussed in the following sections.

A.3 OVERVIEW OF THE WMPT SCORING APPROACH

The previous section established the general theoretical construct (i.e., multiplying exposure and toxicity) used by the WMPT scoring algorithm. This section provides more detail on the structure of the scoring algorithm, including what individual factors and subfactors go into generating scores to reflect exposure and toxicity, and how these scores are aggregated. The scoring of the factors and subfactors related to exposure and toxicity is discussed at a conceptual level in this appendix; specific details are presented in Appendices B and C, respectively.

A.3.1 Scoring and Aggregation Algorithm

As illustrated in Exhibit A-1, the WMPT scoring algorithm is designed to generate an overall chemical score that reflects a chemical's potential to pose risk to both human health and ecosystems. Mathematically, the overall chemical score is derived as the sum of two "potential-level" scores, one reflecting the human health risk potential and the other the ecological risk potential of the chemical. The

[2] As discussed later, low, medium, and high "bins" are used to represent the P, B, and T scores. Each bin, therefore, would cover roughly two orders of magnitude, based on this example.

overall score, therefore, is derived based on a risk management decision to integrate both human health and ecological concerns. This decision is based on the logic that chemicals of high concern from both a human health and ecological standpoint are arguably a higher priority than chemicals that are of high concern from only one or the other standpoint.

The Human Health Risk Potential score is derived by adding two "factor-level" scores, one reflecting the chemical's toxicity to humans and the other the chemical's potential for exposure (see Exhibit A-2). As noted before, WMPT uses a small number of relatively simple measures to represent a chemical's exposure potential and toxicity, consistent with a screening-level approach and with other systems of this type. These measures are generally called "subfactors" in the tool. It is at the subfactor level that WMPT actually evaluates chemical-specific data and generates scores. The Human Toxicity score is derived by taking the higher of the two subfactor scores, i.e., (1) Cancer Effects, and (2) Noncancer Effects. The Human Exposure Potential factor score is derived as the sum of three chemical-specific subfactor scores: (1) Persistence, (2) Bioaccumulation Potential, and (3) Mass. The addition of subfactor scores to obtain factor- and potential-level scores is based on Equation 6.

Similar to the Human Health Risk Potential score, the Ecological Risk Potential score is derived by adding two "factor-level" scores, one reflecting the chemical's toxicity to aquatic ecosystems and the other the chemical's potential for exposure (see Exhibit A-3). The Ecological Toxicity factor is scored currently using only one subfactor—Aquatic Toxicity. The Ecological Exposure Potential factor score is derived in the same way as (and is equal to) the Human Exposure Potential factor score. The addition of subfactor scores to higher levels is based on Equation 7.

As shown in both Exhibits A-2 and A-3, scores are first generated at the subfactor level and these scores are then "aggregated upward" until an overall chemical score is generated. A score for a given subfactor is derived by evaluating certain "data elements" that appropriately represent that subfactor. Appendices B and C describe how, in selecting the types of data elements to be used to score the various subfactors in WMPT, EPA has tried to be as consistent as possible with approaches used in other chemical screening methods and systems, particularly those developed and used within the Agency. The specific subfactors and data elements are briefly discussed in the next two sections.

Exhibits A-2 and A-3 also show that the score for the Human Toxicity and Ecological Toxicity factors can range from 1 to 3. The scores for the Human Exposure Potential and Ecological Exposure Potential factors can range from 2 to 6, when scores for only the P and B subfactors are considered, without incorporating the Mass score. Because the score for the Mass subfactor is derived as a continuous variable, use of this score will alter the range of the Exposure Potential scores by an amount that is application-specific. Thus, the scores for the Human Health Risk Potential and Ecological Risk Potential each can range from 3 to 9, again, by considering scores for only P, B, and T, without incorporating the Mass score. Accordingly, the overall chemical score based on PBT alone (without mass) can range from 6 to 18.

A.3.2 Subfactors Used in Scoring Toxicity

A chemical's toxicity is a key determinant of its risk potential. The WMPT scoring approach emphasizes long-term or chronic toxicity; therefore, the WMPT exposure component stresses bioaccumulation and persistence, both of which indicate the likelihood and potential magnitude of chronic exposure. Chemical toxicity is represented in the WMPT algorithm by two factors: (1) Human Toxicity, and (2) Ecological Toxicity. The Toxicity scoring approaches, including specific data elements, sources of data, fencelines, and limitations, are described in greater detail in Appendix C.

EXHIBIT A-1
Overview of the WMPT Scoring Algorithm

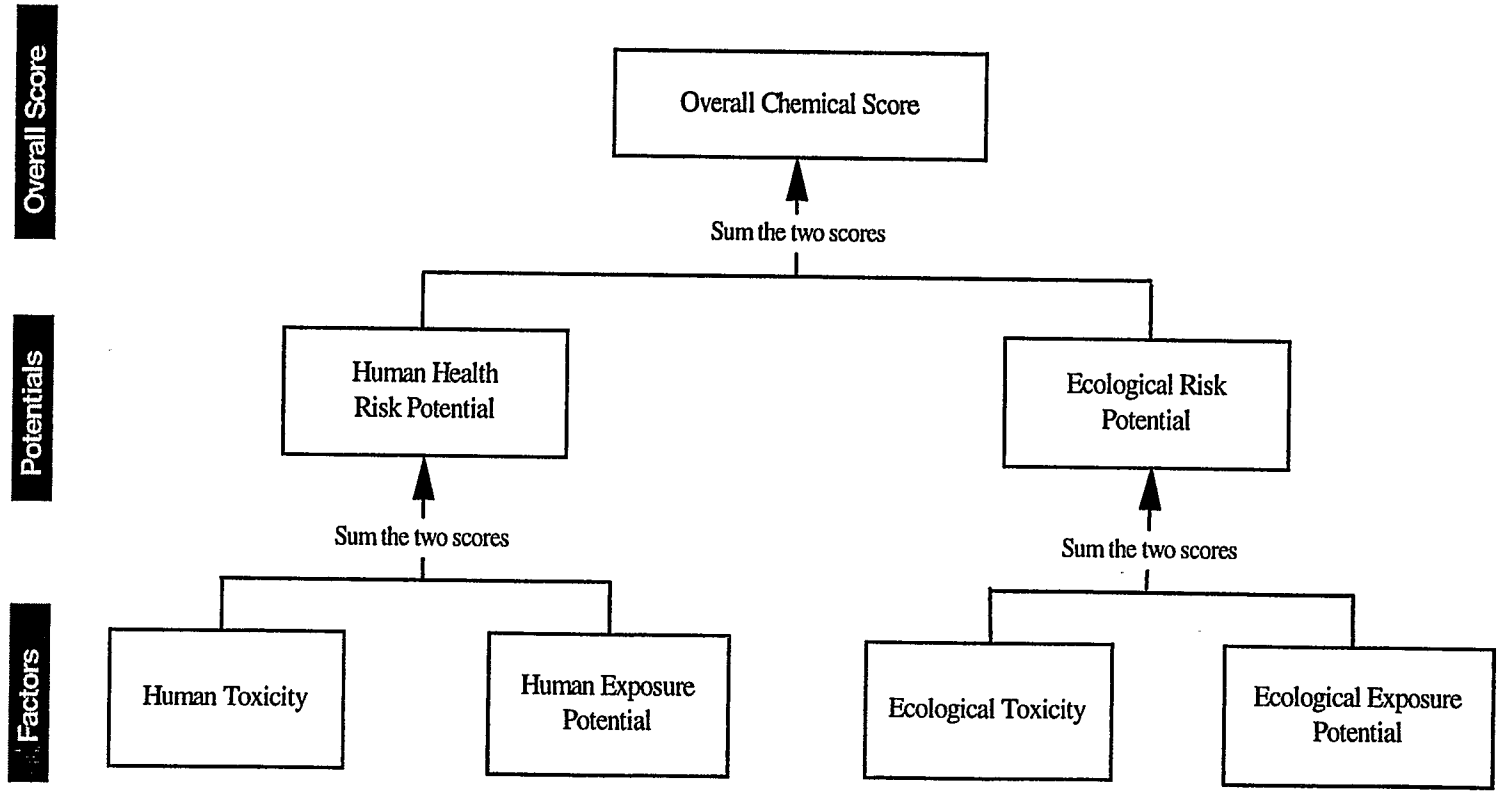


EXHIBIT A-2
Overview of the Human Health Risk Potential Scoring

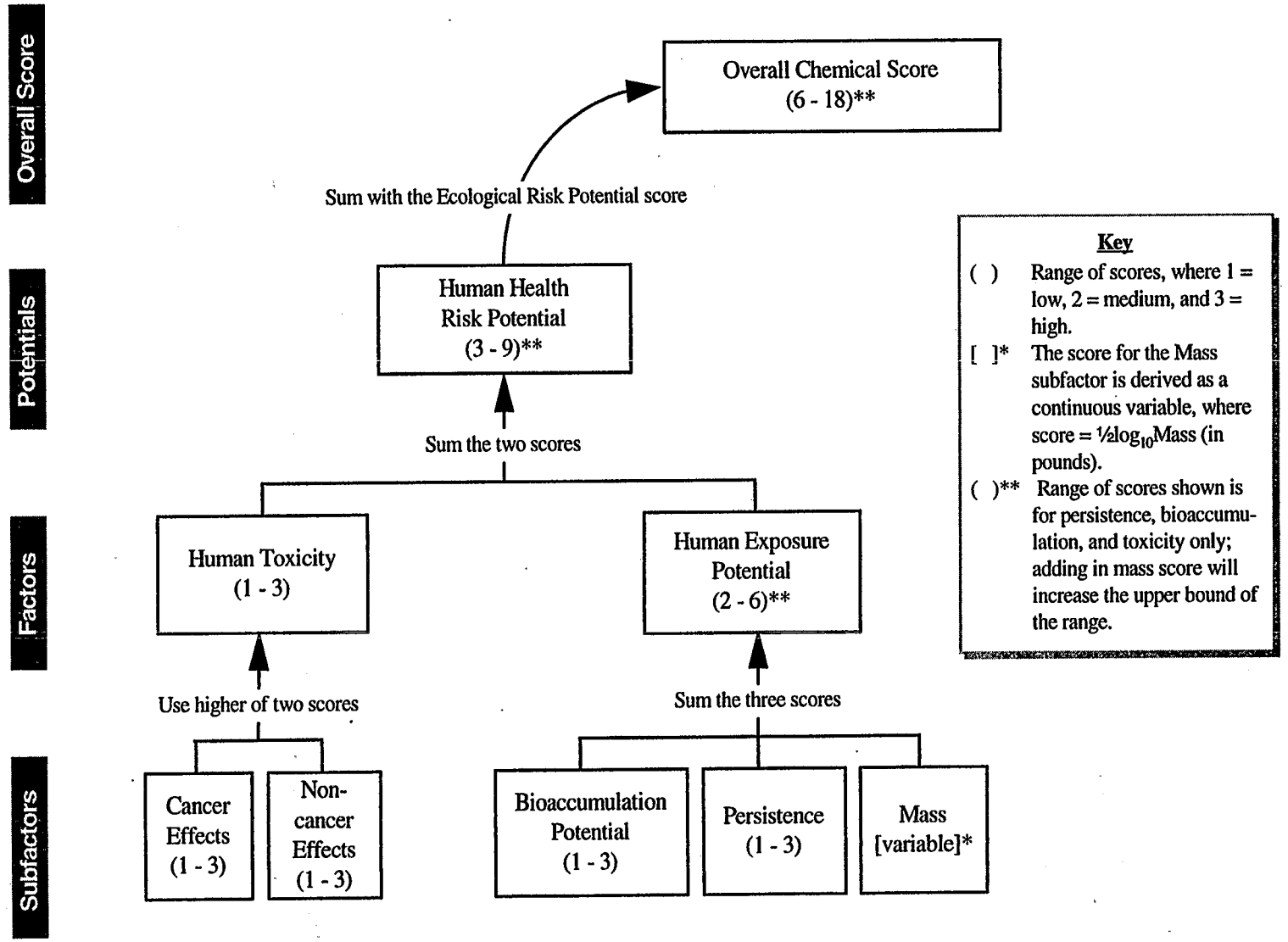
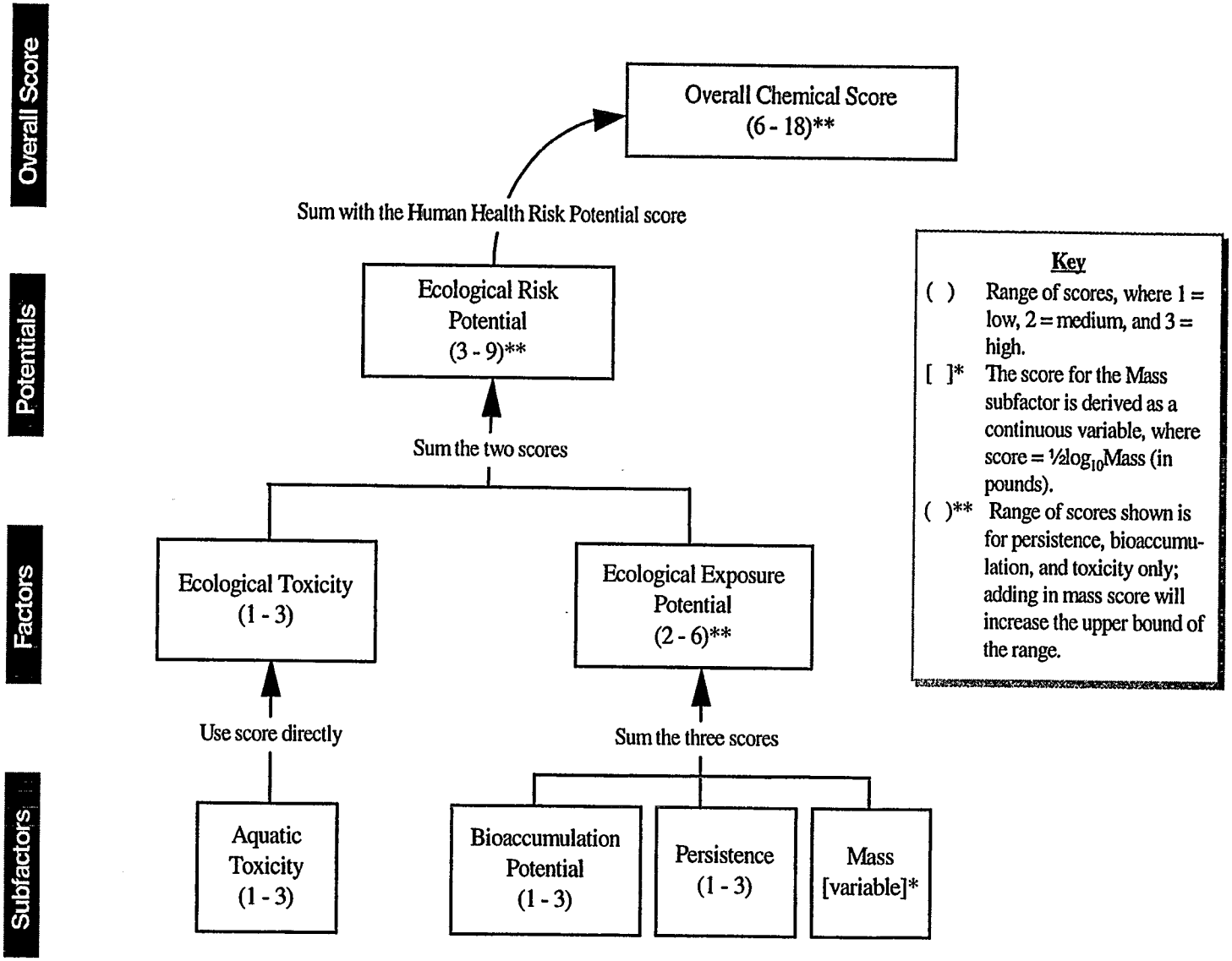


EXHIBIT A-3
Overview of the Ecological Risk Potential Scoring



Human Toxicity Factor

The Human Toxicity factor evaluates adverse effects to human health from chronic exposures. Human Toxicity is scored using two subfactors: (1) Cancer Effects and (2) Noncancer Effects. The Cancer Effects subfactor is assigned a score of 1(low concern), 2 (medium concern), or 3 (high concern) by comparing indicators of a chemical's likelihood to cause cancer (e.g., cancer slope factors or potency factors) against specified fencelines. In addition, the weight-of-evidence associated with the cancer potency or slope factors is used in a decision-rule framework to select the relevant fencelines for scoring the cancer effects. The Noncancer Effects subfactor is scored by comparing indicators of a chemical's potential to cause chronic noncancer effects (e.g., EPA Reference Doses (RfDs), Reference Concentrations (RfCs)) to specified fencelines. The higher of the two subfactor scores becomes the Human Toxicity factor score, as illustrated in Exhibit A-2.

Ecological Toxicity Factor

The Ecological Toxicity factor addresses the potential for a chemical to cause adverse effects on ecosystems. The WMPT scoring approach currently uses one subfactor—Aquatic Toxicity—to score the Ecological Toxicity factor. The WMPT algorithm may be revised in the future to address terrestrial ecotoxicity. To the extent possible, measured or estimated chronic aquatic toxicity data are used. For some chemicals, however, acute aquatic toxicity data are used to predict chronic values where they are not available. A chemical-specific value for the highest quality aquatic toxicity data element available for that chemical is compared to specified fencelines to assign a score of 1 (low concern), 2 (medium concern), or 3 (high concern).

A.3.3 Subfactors Used in Scoring Exposure Potential

Three chemical-specific characteristics, referred to as "subfactors," are evaluated to score the Human and Ecological Exposure Potential factors: persistence, bioaccumulation potential, and mass. The reader should refer to Appendix B for a more detailed discussion of the subfactor scoring approaches, including the data elements, sources of data, fencelines, and limitations.

Persistence Subfactor

A chemical's persistence in the environment is a function of both biological and non-biological degradation or loss processes. Biological degradation (i.e., biodegradation) processes degrade chemicals into more elementary compounds through the action of living organisms, such as bacteria or fungi. Non-biological degradation processes degrade chemicals through chemical reactions. The most important non-biological processes are hydrolysis (i.e., reaction with water, or hydrogen ions or hydroxyl ions in water), photolysis (i.e., reaction with sunlight in the air or in water), and oxidation (i.e., reaction with oxygen, activated oxygen, or other free radicals, such as hydroxy radicals, in the atmosphere).

The WMPT scoring approach evaluates biodegradation and hydrolysis to score the Persistence subfactor, using the following five data elements:

(1) estimated biodegradation time as predicted by the Ultimate Survey Model of Biodegradation;
(2) estimated probability of rapid biodegradation as predicted by the Non-linear Model of Probability of Rapid Biodegradation;
(3) measured biodegradation data (from the BIODEG SUM database);
(4) the estimated hydrolysis half-life from the HYDRO program; and
(5) the metal classification.

The scoring of the Persistence subfactor consists of a combination of fenceline and decision rule scoring approaches (see also Section A.5). The first two data elements listed above are evaluated against specified fencelines to determine a "preliminary" Persistence subfactor score, and the last three data elements are used to modify this score. Based on the results of these evaluations, an overall Persistence score of 1 (low concern), 2 (medium concern), or 3 (high concern) is assigned.

Bioaccumulation Potential Subfactor

Several chemical-specific measures can be used to evaluate a chemical's potential to bioaccumulate. These measures or data elements include measured and estimated bioaccumulation factors (BAFs), measured and estimated bioconcentration factors (BCFs), and measured and estimated n-octanol-water partition coefficient values (log K_{ow} or log P).

The WMPT scoring algorithm uses three data elements to score the Bioaccumulation subfactor. For most organic chemicals, the estimated n-octanol-water partition coefficient is used. For metals and some organic chemicals, measured BAFs or BCFs are used. The chemical-specific value for the appropriate data element is compared to specified fencelines to assign a score of 1 (low concern), 2 (medium concern), or 3 (high concern) to the Bioaccumulation Potential subfactor.

Mass Subfactor

The WMPT scoring approach for the Mass subfactor can use several types of data (e.g., TRI data, waste stream data, discharge data) to indicate the mass, or quantity, of the chemical, depending on what data are available to the user. The Mass subfactor is scored by mathematically transforming the potentially releasable mass (e.g., based on the chemical's concentration in waste) or actually released mass (e.g., based on discharge data) of the chemical. Specifically, the Mass subfactor score is derived as one-half of the base 10 logarithm of the mass (in pounds per year) of the chemical in waste or released to the environment. See section B.4.2 in Appendix B for an example of how the mass score is derived.

Use of this algorithm for the Mass subfactor achieves roughly the same scaling as for the other exposure and toxicity subfactors, thus preventing mass from being any more (or less) influential than these other subfactors in determining the overall score. Inclusion of mass in the overall scoring provides important information on exposure potential and allows users to distinguish between two chemicals with similar exposure and toxicity scores (the chemical with substantially higher mass will receive the higher overall score, all other subfactor scores being equal).

A.4 SCORING SUBFACTORS

Three different types of approaches are used in WMPT to generate factor and subfactor scores from quantitative data elements. One approach, called "binning," is used to derive scores for most factors and subfactors, including Persistence (P), Bioaccumulation potential (B), and Toxicity (T). A second approach, called "continuous-scale scoring," is used for the Mass subfactor. A third approach, called "decision rule scoring" is used for cancer effects and persistence subfactor scoring.

A.4.1 Scoring Using "Bins"

The "binning" or "fenceline" scoring approach involves comparing the quantitative value for a given chemical data element against predefined "high" and "low" threshold values for that data element, termed "fencelines." In general, for most data elements, lower numeric values denote higher concern. Thus, if the chemical-specific value for the given data element is greater than the "low" fenceline, the subfactor is assigned a score of 1 (low concern). If the chemical-specific value is less than the "high"

fenceline, the subfactor is assigned a score of 3 (high concern). If the chemical's value for that data element is between the "low" and the "high" fencelines, the subfactor is assigned a score of 2 (medium concern).[3] The fenceline scoring approach is the most commonly used scoring approach in WMPT. For example, in scoring chlorobenzene for Noncancer Effects, the fencelines used for the data element RfD are > 0.1 mg/kg-day for "low" and < 0.001 mg/kg-day for "high." Because chlorobenzene has a data value of 0.02 mg/kg-day for RfD, it receives a score of 2 for Noncancer Effects.

This binning approach, which is very commonly used in chemical scoring and ranking systems, was deemed appropriate for scoring P, B, and T because they each can be scored using any of several relevant, but different, data elements, and the binning approach readily allows all such data elements to be placed on the same scale. For example, Human Toxicity can be scored either using Reference Doses, which are in units of intake dose (mg/kg-day) and can differ by small values between chemicals, or using Reportable Quantities, which are in units of pounds, and differ by relatively large values between chemicals. Using continuous-scale scoring for data elements that have such different units of measure will not allow them to be directly compared.

Another advantage of binning is that it takes into account that chemical data used in screening systems often are not very precise, and grouping data into similar "bins" avoids the false sense that such data are highly precise. Also, as the bins exist in WMPT, very small values and extremely high values for certain data elements fall into bins, thus dampening (limiting) the influence that outliers can have on the overall scoring.

Binning has some drawbacks, however. Because bins can cover a couple of orders of magnitude, not all chemicals within a bin may be of equal concern. Also, there may not be a significant difference between those chemicals that are at the "lower border" of one bin (e.g., the "high" bin) and those at the "upper border" of the adjacent bin (e.g., the "medium" bin).

To reflect the substantial underlying scoring uncertainty, T is scored on roughly a double order-of-magnitude scale; in other words, each bin includes roughly two orders of magnitude of toxicity, and the difference between a scoring value of 1 and 2 (or between 2 and 3) represents a hundred-fold difference in toxicity. Overall, therefore, approximately six orders of magnitude of quantitative variation in toxicity are captured by this scale. While the P and B scoring scales are not explicitly double order-of-magnitude, they are roughly comparable in that a one-point difference in scoring value represents about a two order-of-magnitude difference in exposure potential.

A.4.2 Continuous-scale Scoring

The "continuous-scale scoring" method involves mathematically transforming the actual chemical value for a given data element into a subfactor score. In assigning scores for the Mass subfactor in WMPT, a "continuous scale" was used. The continuous scale approach to scoring was chosen for a couple of reasons. Unlike P, B, and T data, estimates of mass may involve less uncertainty, depending on the source of the data. Also, using continuous-scale scoring for the Mass subfactor allows one to aggregate mass-based scores from smaller to larger "items" where there is an additive relationship between the items. For example, it is possible to derive a mass-based score for each of several chemicals within a waste stream and then aggregate those scores to derive a waste stream-level score.

By design, both the binning and continuous-scale approaches were made to be roughly logarithmic in scale, and each step (e.g., going from a score of 1 to a score of 2) corresponds to roughly a two-order-of-

[3] For some data elements, e.g., the cancer potency slope factor, lower numeric values denote lower concern; in such cases, the fenceline logic is reversed.

magnitude (i.e., 100-fold) increase in the underlying data. One major overall difference, however, is that "binning" has a finite range of scores and the "continuous scoring" range is more open-ended.

A.4.3 Decision Rule Scoring

The "decision rule" scoring method calculates subfactor scores based on a single or a combination of multiple data elements, following a specified set of rules. This approach is used for scoring human cancer effects and persistence. For example, a different set of rules apply in scoring cancer effects for the Human Toxicity Factor, depending on what types of data are available. If a chemical has no cancer potency data available, but its WOE classification is known, the chemical is assigned a score for cancer effects based on the WOE itself, without considering any fencelines. In contrast, if a chemical has cancer potency data available, but its WOE classification is unknown, the chemical is assigned a score for cancer effects by assuming that its WOE classification is B, and fencelines for Slope Factor or RQ Potency Factor relevant to a WOE classification of B are used.

A.5 EVALUATING DATA ELEMENTS BASED ON DATA QUALITY

The design of the WMPT scoring approach is such that several different data elements, all of which vary in terms of "quality," can be used to score each of the subfactors that are part of the algorithm. Based on generally accepted conventions of data use, especially within the Agency, all data elements are grouped into generally three categories of data quality, i.e., high-, medium-, or low-quality, and higher quality data are used preferentially, when available, for the scoring. Higher quality data elements generally reflect a greater level of peer review and consensus in use. The data quality hierarchies for specific data elements are discussed in Appendices B and C.

As an example, the data quality hierarchy for scoring the Noncancer Effects subfactor under Human Toxicity includes high quality data elements, i.e., the Reference Doses (RfDs), Reference Concentrations (RfCs), Reportable Quantities (RQs), and Threshold Planning Quantities (TPQs); medium quality data elements, i.e., Chronic and Subchronic NOAELs and LOAELs; and low quality data elements, i.e., Human Health SAT ranks, and TSCA Section 8(e) submissions. To score chlorobenzene for Noncancer effects, for example, data values are available for the chemical's RfD (0.02 mg/kg-day) and also for its Chronic LOAEL (54.5 mg/kg-day). In this case, the RfD value is used preferentially over the Chronic LOAEL value.

Allowing the use of data of varying quality in the WMPT ensures that a large number of chemicals could be assigned scores based on their PBT properties, while taking advantage of the high quality data that are available. In compiling the underlying database for scoring chemicals in WMPT, U.S. EPA searched readily available and generally accepted sources and incorporated values for the specific data elements for a given chemical, starting with the highest quality data element and working down through the data quality hierarchy. In most cases where values for higher quality data elements were found, U.S. EPA did not search for values for lower-quality data elements in order to conserve resources.

A.6 LIMITATIONS

There are a couple of general limitations associated with the WMPT scoring approach. Please refer to Appendices B and C for a discussion of the limitations associated with the scoring of specific factors and the sources of relevant data required for scoring.

- Use of WMPT does not constitute a risk assessment. The PBT scores reflect inherent hazard only and, other than the mass of the chemical, WMPT does not incorporate any site- or situation-specific factors in its scoring approach. The necessary simplifications

that have been incorporated in WMPT make it unlikely that this scoring approach would be fully consistent with rankings developed based on in-depth risk assessment (e.g., due to the very few factors that are used to reflect either exposure or toxicity, compared to those that are used in a risk assessment).

- WMPT rankings are only as accurate as the input data upon which they are based. Poor mass data, for example, will produce less "accurate" rankings than more reliable mass data.

- Discrimination among chemicals is limited because the underlying scales for most subfactors are limited to three-category scales in the binning approach used.

A.7 REFERENCES

U.S. Environmental Protection Agency (U.S. EPA). 1995. *Final Water Quality Guidance for the Great Lakes System, Final Rule. Federal Register* 15366, March 23.

U.S. Environmental Protection Agency (U.S. EPA). 1994. *Chemical Use Clusters Scoring Methodology.* Washington, DC: Office of Pollution Prevention and Toxics, Chemical Engineering Branch. July 23.

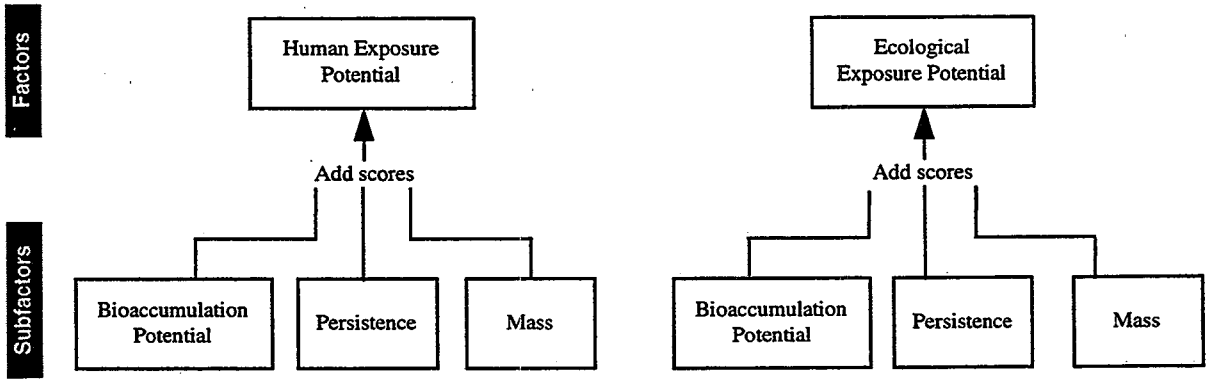
APPENDIX B
SCORING HUMAN AND ECOLOGICAL EXPOSURE POTENTIAL

This appendix presents the details behind the scoring of human and ecological exposure potentials. Section B.1 provides an introduction. Section B.2 discusses the scoring of persistence. Section B.3 presents the scoring of bioaccumulation. Section B.4 explains the scoring of mass.

B.1 INTRODUCTION

Two WMPT scoring factors address chemical exposure—Human Exposure Potential and Ecological Exposure Potential. Each of these factors is scored using the same approach and indicators of exposure potential. While a chemical's human and ecological exposure potential might well differ in the context of a comprehensive risk assessment, at the level of detail and data availability for which WMPT was designed, it was not feasible to differentiate between these factors. As shown in Exhibit B-1, three chemical-specific characteristics, referred to as "subfactors," are evaluated to score the Human and Ecological Exposure Potential factors: persistence, bioaccumulation potential, and mass.

EXHIBIT B-1
Exposure Potential Factors and Subfactors



These WMPT exposure-related subfactors measure the following:

- The potential for the chemical to accumulate in plant and animal tissue (e.g., the chemical's bioconcentration factor);
- The potential for the chemical to persist in the environment (e.g., the chemical's biodegradation rate); and

Exposure

Exposure is defined as contact of an organism with a chemical, and generally refers to the amount of the chemical available for uptake at the organism's exchange boundaries (e.g., skin, lungs).

- The magnitude of potential or actual release to the environment (e.g., the mass or amount of chemical available for release, the chemical's rate of release).

Other exposure factors not related to the chemical (e.g., size and location of exposed population, duration of exposure) are also important considerations in risk assessments. As a screening-level tool, however, WMPT addresses only chemical-specific indicators of exposure.

B.2 PERSISTENCE

A chemical's persistence in the environment is a function of both biological and non-biological degradation or loss processes. Biological degradation (i.e., biodegradation) processes degrade chemicals into more elementary compounds though the action of living organisms, such as bacteria or fungi. Non-biological degradation processes degrade chemicals through chemical reactions. The most important non-biological processes are hydrolysis (i.e., reaction with water, or hydrogen ions or hydroxyl ions in water), photolysis (i.e., reaction with sunlight in the air or in water), and oxidation (i.e., reaction with oxygen, activated oxygen, or other free radicals, such as hydroxy radicals, in the atmosphere).

Persistence

Persistence is the tendency of a chemical to remain in the environment without transformation or breakdown into another chemical form (e.g., to require relatively long periods of time to be degraded by microorganisms and/or by chemical processes). Persistence indicates how long a chemical is expected to exist in the environment and, thus, be available for exposure. Environmental persistence is a more important criterion for assessing risks of long-term exposures than risks of acute exposures. Relatively speaking, the greater the persistence of the chemical, the greater the potential for human and ecological exposure to the chemical.

The WMPT scoring approach emphasizes biodegradation because it is the most important degradation process for the majority of chemical substances released to soil and water, often determining whether a substance is persistent or degrades relatively rapidly. Moreover, biodegradation in wastewater treatment plants is a major pollution control process and often determines whether a chemical is released to the environment in the first place. The WMPT evaluates biodegradation and hydrolysis to score the Persistence subfactor, using the following five data elements:

(1) estimated biodegradation time as predicted by the Ultimate Survey Model of Biodegradation;
(2) estimated probability of rapid biodegradation as predicted by the Non-linear Model of Probability of Rapid Biodegradation;
(3) measured biodegradation data (from the BIODEG SUM database);
(4) the estimated hydrolysis half-life from the HYDRO program; and
(5) metal classification.

The scoring of the Persistence subfactor consists of a combination of fenceline and decision rule scoring approaches. The first two data elements listed above are evaluated against specified fencelines to determine a "preliminary" Persistence subfactor score, and the latter three data elements are used to modify this score. Based on the results of these evaluations, an overall Persistence score of 1 (low concern), 2 (medium concern), or 3 (high concern) is assigned. The data elements and scoring thresholds used to develop chemical persistence score are shown in Exhibits B-2 and B-3.

EXHIBIT B-2
Persistence Scoring Thresholds

Data Element	Scoring Thresholds			
	High (3)	Medium (2)	Low (1)	Not Scored
Predicted Persistence Score	3	2	1	---
Persistence Adjustment				
--Biodegradation Rate (Biodegrades fast, high reliability)	flag	reset to 1	---	---
--Hydrolysis Rate (Half-life less than 1 day at pH 7)	flag	reset to 1	---	---
--Metal Category - Elemental Metal	---	---	---	reset to 3

B.2.1 Data Elements Used to Score Persistence, Including Data Sources

Predicting Persistence Using Biodegradation Models

For most organic chemicals, biodegradation in surface water, ground water, soil, and sediment is the degradation process most critical in determining whether a chemical is persistent or degrades relatively rapidly. However, experimental biodegradation data are typically lacking entirely or do not exist in a form that can be easily incorporated into automated screening tools such as the WMPT. Using both qualitative and quantitative data, as well as a number of structural or physical/chemical properties, predictive biodegradability correlations and models have been developed to support EPA risk screening activities, including those related to the new chemicals program, mandated under Section 5 of the Toxic Substances Control Act (TSCA), as well as the TSCA-mandated screening of existing chemicals by the U.S. Interagency Testing Committee (U.S. EPA, 1994). Similar to the focus of WMPT, these models support generation of quantitative or semi-quantitative estimates of biodegradation rates and estimate the probability of rapid biodegradation for use at the chemical screening level.

WMPT uses information from two models of this type to determine the predicted persistence for chemicals in the environment. The first model estimates approximate time required for complete biodegradation of a chemical in typical soil and water environments, and was developed using knowledge obtained from a panel of experts (Ultimate Survey Model). Model predictions are based on the presence of chemical substructures such as halogen atoms (e.g., chlorine) and hydroxyl groups. The second model provides an estimate of the probability of rapid biodegradation and is based on actual test data. It similarly uses chemical substructures to make predictions (Non-linear Probability Model). The model values for each chemical are entered in Exhibit B-3 and the predicted persistence rank taken from the final column of this table. The WMPT predicted persistence scoring approach is consistent with that used in EPA's Office of Pollution Prevention and Toxic's Use Clusters Scoring System (UCSS) (U.S. EPA, 1994), which is used to support EPA's existing chemicals program. The development of each of these models is discussed below.

Predicting Persistence Using Ultimate Survey Model

The Ultimate Survey Model (Boethling, 1989 and 1994; Howard, 1995) was created using the results of a survey of 17 experts who ranked two hundred organic chemicals on their estimated rates of

EXHIBIT B-3
Predicted Environmental Persistence Chemical Scoring (Boethling, 1995)

Ultimate Survey Model of Biodegradation	Non-linear Model Probability of Rapid Biodegradation	Persistence Score
≤ 2	-----	high (3)
> 2 to ≤3	-----	medium (2)
> 3 to ≤ 4	< 0.5	medium (2)
	≥ 0.5	low (1)
> 4	-----	low (1)

primary degradation (loss of parent chemical identity) and ultimate degradation (conversion to CO_2 and water) under aerobic conditions.[1] The 200 chemicals were selected to represent the diversity of organic chemicals subject to review by EPA. The experts assigned each chemical an estimated ultimate biodegradability time using the words hours, days, weeks, months and longer than several months. These words were intended to suggest the approximate (order of magnitude) time that would be required for a given chemical to degrade completely in typical aerobic environments in water and soil. In order to develop an arithmetic mean of the ratings (words) assigned by the experts to each chemical, numeric values were assigned as follows:

- "1" indicated an estimated biodegradation time longer than several months
- "2" indicated an biodegradation time in months
- "3" indicated an estimated biodegradation time in weeks
- "4" indicated an estimated biodegradation time in days
- "5" indicated an estimated biodegradation time in hours

To further analyze the experts' rating, counts of the frequency of occurrence of 36 structural fragments contained in each chemical were also completed. The structural fragments were selected based on generally acknowledged rules of thumb concerning the effects of chemical structure on biodegradability.

After calculating the mean biodegradation "rate" as expressed on the above scale of 1 to 5 and structural fragment counts, multiple linear regressions were performed on the data using the mean scores as dependent variables and the structural fragment counts and molecular weight as independent variables. Regression-derived coefficients were calculated for each independent variable. The result of these analyses is the Ultimate Survey Model, which estimates the biodegradation time of organic chemicals on a scale from one to five based on chemical substructure information. What the model actually calculates is the numerical biodegradability "score" and this number must be related to the terms used by the experts (days, weeks, etc.) for interpretation. Since the experts were not asked to estimate actual half-lives but rather to use specific terms to describe biodegradability, this is in effect what the model calculates.

Assignment of fencelines using such a measure of persistence is straightforward, since any reasonable analysis would suggest that chemicals requiring months or more to degrade completely (i.e., ≤ 2 in the model) should properly be placed in the high persistence category. Selection of a fenceline between medium and low persistence is somewhat less obvious, but clearly any fenceline should designate

[1] Documentation of the ultimate survey model has not yet been published. An earlier survey was conducted using the same general method and can be found in Boethling, et al. 1989.

chemicals expected to degrade in days (= 4) or less as low. The WMPT designates chemicals in the range ≤ 3 but > 2 ("weeks to months") as medium for persistence, but uses a second model, the Non-linear Probability Model, to choose between low and medium persistence scores when the Ultimate Survey Model prediction is in the range ≤ 4 but > 3 ("days to weeks"). The way this works is that if the Non-Linear Model estimates the probability of rapid biodegradation to be low (i.e., < 0.5), the WMPT errs on the side of conservatism by scoring persistence as medium rather than low.

To assess the accuracy of the ultimate survey expert estimates, experimental data for all survey chemicals were retrieved from EPA's BIODEG file, discussed below. An approximate ultimate biodegradation time was estimated for 13 of the survey chemicals with literature data. The estimated biodegradation times were then compared to the mean expert estimate of ultimate biodegradability. The expert estimates were found to be generally consistent with the experimental data (Boethling, 1994).

Predicting Persistence Using Non-linear Probability Model

The second model used in developing a chemical predicted persistence score, the Non-linear Model of Biodegradation, generates an estimate of the probability of rapid biodegradation. This model was developed from a file of evaluated biodegradation data for over 800 organics to support efforts to predict the persistence of diverse groups of organic chemicals. This data file, called BIODEG, is a component of the Environmental Fate Database, used by EPA to support the TSCA-mandated new and existing chemical programs. In the BIODEG file, each test result is assigned a qualitative biodegradability descriptor, such as BF (Biodegrades Fast) or BSA (Biodegrades Slowly even with Acclimation) (Exhibit B-4). For each chemical, summary descriptors are then developed from the descriptors for individual test results. The summary descriptors use the same codes (BF, BSA, etc.) and are developed for each of several data types if data exist; e.g., there are separate summary codes for screening studies, grab sample studies, field studies, etc. An overall aerobic biodegradability summary code is also developed, for every chemical with at least one aerobic biodegradation study of any type. Finally, reliability codes, indicating the amount and consistency of available data, are assigned to each summary code (but not individual study results), following the scheme in Exhibit B-4. The summary and reliability codes are placed in a separate data file called BIODEG SUM.

To develop the non-linear model of biodegradation, the frequency of occurrence of the same structural fragments used in the Ultimate Survey model analysis, such as esters or tertiary alcohols that are known from EPA's past experience to affect the rate of biodegradation, were counted for each chemical in the database. To model the effect of each of these structural fragments on a chemical's probability to biodegrade, 264 chemicals from the file that had good experimental biodegradation data and contained at least one of the structural fragments were identified. Each of the chemicals was then classified as a rapid or slow biodegrader. An indicator variable was developed in which all the rapid biodegraders were assumed to have a probability of rapid biodegradation of one and all slow biodegraders were assumed to have a probability of zero. The indicator variable was then used as the dependent variable in multiple nonlinear regressions against the structural fragment counts and molecular weight. Based on these calculations, the contribution to rapid biodegradation of each of the independent variables, structure and molecular weight, was estimated. These results were then used to create a non-linear model that calculates the estimated probability that a chemical is a rapid or a slow biodegrader based on structure and molecular weight information. An estimated model probability greater than or equal to 0.5 indicates a rapid biodegradation rate while a probability under 0.5 indicates a slow biodegradation rate.

To validate this model, the predicted non-linear biodegradation probabilities were compared against a set of chemicals with consistent experimental biodegradation rates. The model was shown to classify the chemicals with over 90 percent accuracy. It should be noted that the rapidly degrading chemicals were classified more accurately than the slowly degraded chemicals (Boethling, 1994; Howard, 1992).

Limitations of Modeling

Several limitations of the model approaches discussed above are as follows:

- The structural approach to biodegradability modeling used in both the Ultimate Survey and Non-linear Biodegradation Models does not take into account the possible interactions of fragments in multifunctional molecules. However, these models do provide quantitative or semi-quantitative estimates of biodegradation rates sufficient for use in WMPT chemical screening efforts.

- Both the ultimate survey and non-linear biodegradation models address only the estimated biodegradation of the chemical, and do not account for the possibility of abiotic chemical degradation through hydrolysis, photo-oxidation, photolysis or reduction. However, several adjustment factors reflecting hydrolysis rates and uncertainty in biodegradation rates are applied to the model-predicted persistence values as discussed below.

- The emphasis of the WMPT is on screening for persistent, bioaccumulative, and toxic chemicals. Therefore, aquatic and terrestrial exposure is of more direct interest than the fate of certain chemicals in the air. Although predictions of high persistence from the models could indicate potential for long-range transport of chemicals via air, deposition to surface waters, and resulting aquatic terrestrial exposures, no satisfactory models have been identified that adequately predict persistence in air for use in these chemical screening efforts.

Measured Biodegradation Data from BIODEG SUM

EPA began development of an environmental fate and exposure database in 1979 (Howard, 1986). One component of this database, the BIODEG database, contains a large collection of test data on the microbial degradation of chemicals. As discussed above, this data was collected for the purpose of

EXHIBIT B-4
BIODEG SUM Database Biodegradability Codes

Biodegradability Code	Description
BF	Biodegrades at a fast rate.
BFA	Biodegrades at a fast rate with acclimation.
BS	Biodegrades at a slow rate.
BSA	Biodegrades at a slow rate even with acclimation.
BST	Biodegrades sometimes.
NB	No biodegradation.
NE	No evaluation.
Reliability Code	**Description**
1	Chemical tested in three or more tests with consistent results.
2	Chemical tested in two tests or results in more than two tests are interpretable but some conflicting data.
3	Only one test or uninterpretable conflicting data.

developing structure/biodegradation relations (Howard, 1987). Due to issues with the test data, such as pure vs. mixed culture studies, acclimation affects, direct or indirect measurement of biodegradation rates, test protocols, and test reproducibility, biodegradability was assessed using a weight-of-evidence approach. This approach assumes that as the number of consistent test results or test results for which apparent resolvable inconsistencies increases, the greater the likelihood that the biodegradation indicator is a property of the chemical rather than of the test system (Howard, 1987). This weight of evidence approach was implemented by entering the data for each test into a database, evaluating the test data, and assigning a biodegradability and reliability code as shown in Exhibit B-4.

A biodegradability code of BF-1 indicates that chemical biodegradation will take place rapidly under most environmental conditions without any special conditions or acclimation, by which microorganisms can degrade a chemical more rapidly. These chemicals can be degraded by species that are widespread in the environment. The reliability code is an indicator of the amount of information supporting the biodegradation rate code. A BF-1 code was used to adjust the WMPT persistence subfactor score for chemicals based on ultimate survey and non-linear model of biodegradation rates. A WMPT persistence subfactor score of medium was reset to low if the chemical had a BF-1 biodegradability code. Chemicals with a persistence subfactor score of high and a BF-1 biodegradability code were flagged to indicate that the "Potential Exists for Formation of Persistent Biodegradation Byproducts."

Hydrolysis Half-life from HYDRO

The hydrolysis rate of a chemical once released to the environment has a significant impact on its persistence. Chemicals with relatively short half-lives are expected to hydrolyze quickly upon release to the environment and should be assigned a lower persistence than those with longer half-lives. The HYDRO component of EPA's Estimations Program Interface (EPI) application estimates aqueous hydrolysis rate constants at 25°C for selected chemical classes, such as esters, carbamates, epoxides, halomethanes, and selected alkyl halides. The hydrolysis rate constants are estimated based on the chemical compound structure and are calculated from regression equations using experimental hydrolysis data. The HYDRO program estimates acid- or base- catalyzed rate constants only; neutral hydrolysis rates are not estimated. Overall hydrolysis constants are the sum of the acid- catalyzed, base-catalyzed, and neutral hydrolysis rate constants, therefore, if the neutral hydrolysis rate constant is the dominant constant, the acid or base-catalyzed estimate will not be a true indication of the hydrolysis rate.

The estimated chemical half-life calculated by HYDRO is based on the total base- or acid-catalyzed rate constant. A predicted chemical hydrolysis half-life value at pH 7 of less than 1 day was used to reset a medium persistence subfactor score based on ultimate survey and non-linear model data to low. Chemicals with a persistence subfactor score of high and a predicted hydrolysis half-life of less than 1 day were flagged to indicate that the "Potential Exists for Formation of Hydrolysis Products."

Metal Classification

Data elements used to generate persistence scores for metals and metal-containing compounds are not estimated by many of the modeling programs discussed earlier in this section. To generate a persistence score for these compounds, WMPT chemicals were reviewed and classified into one of the following five metal categories where appropriate: elemental metals; metal salts, such as organic or inorganic salts of alkali or alkaline earth metals; other organic or inorganic metal salts; metal compounds (other than salts); minerals, including metal silicates, metal sulfides, and metal oxides; and radionuclides.

WMPT chemical persistence subfactor scores were set to high for any elemental metals. One limitation of this approach is that consideration of the behavior of the other metal-containing compounds in the environment has not been incorporated into the persistence scoring methodology. The persistence of metal-containing compounds in the environment will vary based on the physical/chemical properties of the

individual compounds. Some metal-containing compounds, such as minerals, may be expected to be persistent in the environment when released to either water or solid media. Other metal-containing compounds, particularly when released to water, may dissociate to metal ions and the corresponding counter ions. The disassociated metal ions may potentially complex with other substances to form precipitates, other relatively innocuous and non-persistent substances, or potentially toxic, persistent substances. Factors affecting the persistence of metal-containing compounds include the media of release, other species present in the media, and the pH of the media.

B.2.2 Persistence Scoring Limitations

Factors affecting persistence include the media of release, other chemical species present in the media, the pH of the media, and the temperature. The models used to predict persistence values address only the estimated biodegradation of the chemical, and do not account for the possibility of abiotic chemical degradation through hydrolysis, photo-oxidation, photolysis, or reduction. In addition, these models focus on release in water, and do not address the potential chemical partitioning through volatilization from water into air, atmospheric oxidation, or soil adsorption. Adjustments to account for hydrolysis and the rate of aerobic biodegradation were used; however, only limited data were available.

Additionally, persistence scoring data elements are not available for a number of metals and metal-containing compounds. Elemental metal persistence values were adjusted as described in Section B.2.1; however, the expected persistence of metal-containing compounds is not addressed.

Although these factors provide additional data valuable in estimating the expected persistence of a chemical in the environment, the models incorporated into WMPT have undergone peer review and the methodology is consistent with that used in many other similar risk screening activities (Boethling, 1994; Howard, 1992, 1986, and 1987). WMPT incorporates appropriate quantitative or semi-quantitative estimates of persistence required for performing a chemical screening analysis.

B.2.3 Persistence Scoring References

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User's Guide for HYDRO. (Undated). *PC Software to Estimate Aqueous Hydrolysis Rates. Version 1.0,* undated. Syracuse, NY: Syracuse Research Corp.

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B.3 BIOACCUMULATION

Several chemical-specific measures can be used to evaluate a chemical's potential to bioaccumulate. These measures or data elements include measured and estimated bioaccumulation factors (BAFs), measured and estimated bioconcentration factors (BCFs), and measured and estimated n-octanol-water partition coefficient values (log K_{ow} or log P).

For organic chemicals, WMPT uses predicted log K_{ow} values to score the Bioaccumulation Potential subfactor. For metals and inorganic metal compounds, WMPT uses measured BAF values to score the Bioaccumulation Potential subfactor because log K_{ow} values cannot be derived for these compounds. Where BAFs are not available, measured BCF values are used to score the metal or inorganic metal compound.

The WMPT data quality hierarchy for bioaccumulation subfactors starts with log K_{ow} values and BAFs (both designated as "high quality") and then proceeds to BCFs (designated as medium quality). While this hierarchy departs somewhat from hierarchies that are applied elsewhere (e.g., EPA's Office of Water specifies that measured BAFs and/or measured BCFs are preferable to log K_{ow} values), there are several important reasons for adopting the WMPT approach:

- Predicted log K_{ow} values are available for many more chemicals than are measured BAFs and BCFs. The use of measured values would greatly reduce the number of chemicals that could be scored for persistence in WMPT.

- Measured BAF and BCF data tend to be more specific to a particular site, species, or set of test conditions, which is why they are often preferred to log K_{ow} data in other applications. For the type of general chemical screening conducted with WMPT, the more general predictions of bioaccumulation potential provided by log K_{ow} data are arguably more relevant.

Bioaccumulation Potential

Bioaccumulation potential – the capacity of a chemical to increase in concentration or accumulate (be stored in tissue) in an organism as a result of uptake from all environmental sources over a period of time (U.S. EPA, 1995a). Bioaccumulation potential indicates the degree to which a chemical is accumulated by living organisms to higher concentrations (sometimes much higher) than in the surrounding environmental media. It also indicates the degree to which chemical concentrations (and thus exposures) may be magnified in food webs. Bioaccumulation potential is a critical criterion for assessing ecological risks and human risks via food chain exposure pathways. All else being equal, chemicals with higher bioaccumulation potential will produce higher exposure levels than chemicals with lower bioaccumulation potential, especially for animals at higher trophic levels.

- Log K_{ow} values correlate well with BAF and BCF values for chemicals that are hydrophilic/lipophobic, i.e., that have log K_{ow} values less than 5 (U.S. EPA, 1995a; Gobas 1993). Therefore, log K_{ow} values in this low to medium range are reasonably good predictors of BAF and BCF values and of chemical bioaccumulation potential. Chemicals that are hydrophobic/lipophilic (with log K_{ow} values grater than 5) are expected to have high bioaccumulation potentials (with the possible exception of a limited number of "superlipophilic" chemicals with log K_{ow} values greater than approximately 8). Therefore, the fact that log K_{ow} values may understate BAFs and BCFs in this high range does not affect the "high" scores that WMPT would assign to them.

The WMPT data quality hierarchy for the bioaccumulation subfactor is generally consistent with OERR's Risk Assessment Guidance (U.S. EPA, 1996) and OPPT's approach for evaluation of new and existing chemicals (U.S. EPA, 1992), which specify that BAFs, BCFs, and/or log K_{ow} values can be used to assess chemical bioaccumulation potential in human and ecological risk assessments.

The WMPT Bioaccumulation Potential subfactor log K_{ow} fencelines are similar to those used in OPPT's evaluation of new and existing chemicals (U.S. EPA, 1992) and OPPT's approach to screening the TSCA inventory for the proposed persistent bioaccumulators rule (U.S. EPA, 1989b). WMPT's log K_{ow} high concern fenceline (greater than 5) is slightly higher than the fenceline (greater than 4.3) used for these other efforts.

B.3.1 Data Elements Used to Score Bioaccumulation, Including Data Sources

Log K_{ow} (logarithm of the n-octanol-water partition coefficient)

The log K_{ow} is a measure of the extent of chemical partitioning between water and n-octanol at equilibrium (U.S. EPA, 1989a). The greater the log K_{ow}, the more likely a chemical is to partition to the octanol than to remain in the water. Octanol is used as surrogate for fat or lipids found in biological organisms. Thus, the higher the log K_{ow}, the more likely a chemical will partition to (and accumulate in) fats in biological organisms.

The WMPT accesses a data set of log K_{ow} values available for 17,000 organic chemicals. These log K_{ow} values were calculated using CLOGP 3.3 (Leo, 1985), a computer program developed at Pomona College in conjunction with EPA's Duluth Laboratory, which uses the chemical's structure to estimate its n-octanol-water partition coefficient, and EPA's EPI database (Howard, 1996). The criterion was used in EPA's Environmental Hazard Communication (EHC) environmental toxicity evaluation (U.S. EPA, 1991). The scoring fencelines for log K_{ow} correspond to those used in the EHC and are shown in Exhibit B-5.

EXHIBIT B-5
Bioaccumulation Scoring Fencelines

Data Element	Data Quality	Scoring Fencelines		
		High (3)	Medium (2)	Low (1)
Log K_{ow}	High	≥ 5	≥ 3.5 to < 5	< 3.5
Bioaccumulation Factor	High	≥ 1,000	≥ 250 to < 1,00	< 250
Bioconcentration Factor	Medium	≥ 1,000	≥ 250 to < 1,000	< 250

Bioaccumulation Factor Data

Bioaccumulation is the process through which chemical substances accumulate in living organisms. Bioaccumulation may occur directly through oral, dermal, or inhalation routes, or indirectly through uptake via the food chain. The bioaccumulation factor (BAF) is the ratio of a concentration of a contaminant in an organism to the concentration in the ambient environment at steady state, where the organism can take up the contaminant through ingestion with its food as well as through direct contact with the medium (e.g., water, sediments) (U.S. EPA, 1996). The higher the BAF, the greater the bioaccumulation potential. Most EPA guidance generally recommends field-measured BAFs as the best data for assessing the bioaccumulation potential of organic and inorganic chemicals (although it may be for very specific applications).

BAF data for WMPT chemicals were extracted from HWIR documentation (U.S. EPA, 1995b) and OPPT's environmental fate ISISbase system. WMPT BAF scoring thresholds were set equal to bioconcentration factor scoring thresholds. Exhibit B-5 shows the BAF scoring fencelines.

Bioconcentration Factor Data

The bioconcentration factor (BCF) is a measure of the extent of chemical partitioning at equilibrium between a biological medium such as fish tissue or plant tissue and an external medium such as water (U.S. EPA, 1989a). The higher the BCF, the greater the expected accumulation of the chemical in living tissue. BCF differs from BAF in that the BCF does not account for intake via ingestion of food.

In gathering BCF data, measured bioconcentration factors from fish are used preferentially to those obtained from invertebrates, and those from invertebrates are used preferentially over measured values from aquatic plants (U.S. EPA, 1995b). The calculated bioconcentration factor based on the n-octanol-water partition coefficient is used only if values for the other exposure data elements are not available (Howard, 1996; OPPT's environmental fate ISISbase system).

The scoring thresholds for the high, medium and low categories for bioconcentration factor data were established by collecting data on a sample of chemicals and setting the limits so that one-third of the sample set was assigned to each rank. The scoring fencelines for bioaccumulation were assigned to correspond to those used by EPA's Office of Pollution Prevention and Toxics UCSS. Exhibit B-5 shows the BCF scoring fencelines.

B.3.2 Bioaccumulation Scoring Limitations

The tendency for a chemical to bioaccumulate is related to a number of factors, including: chemical partitioning, diffusional transport across cell membranes, transport mediated by bodily fluid, concentration effects related to biomolecule affinity, and biodegradation (Verscheuren, 1996). While the WMPT bioaccumulation scoring methodology incorporates adjustments based on some partitioning effects and biodegradation rates, several of the factors impacting a chemical's tendency to bioaccumulate are not considered. However, the WMPT bioaccumulation data are generally sufficient to perform relative chemical screening analyses.

B.3.3 Bioaccumulation Scoring References

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U.S. Environmental Protection Agency (U.S. EPA). 1996. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. External Review Draft.* Edison, NJ: Office of Emergency and Remedial Response, Environmental Response Team. August.

U.S. Environmental Protection Agency (U.S. EPA). 1995a. *Great Lakes Water Quality Initiative Technical Support Document for the Procedure to Determine Bioaccumulation Factors.* Washington, DC: Office of Water. EPA-820-B-95-005.

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B.4 MASS

As discussed previously, the WMPT scoring algorithm is modeled after the general risk calculation equation, using relatively simple factors to represent toxicity and exposure. Factors used to represent toxicity are discussed elsewhere. Factors used to represent exposure include environmental persistence, which is based on the overall rates of biodegradation and hydrolysis of a chemical in the environment; bioaccumulation potential, which is based on the equilibrium partitioning of a chemical from environmental media (e.g., water) to biota (e.g., fish); and mass, which is used to generally reflect the amount of a chemical that is released or is potentially releasable to environmental media, and thus potentially available as a source of environmental exposure.

In terms of simplified risk-screening tools such as the WMPT, potentially releasable mass can be used as a relatively crude, but widely available, surrogate for potential exposure concentration. Although one can score and rank wastes based on only the PBT scores of the wastes' constituent chemicals, it is apparent that for finer "resolution" of the rankings, mass of the different constituent chemicals needs to be evaluated along with the chemicals' PBT scores. This is because a given PBT chemical is likely to be of greater concern if it is present in larger quantities in a waste stream, all other things being equal.

B.4.1 Data Elements Used to Score Mass

The WMPT algorithm can use, as a surrogate for potential exposure concentration, measures of mass that reflect either of the following:

- amount of a given chemical that is potentially releasable, which can be measured as the mass of a chemical in wastes as generated; or
- amount of a given chemical that is actually released to the environment, which can be measured directly as the mass released to specific environmental media.[2]

Given this structure of the algorithm, only one data element is used for scoring the mass factor, i.e., the mass of the chemical. Several different data types and sources, however, can be used to derive a measure of mass for this data element. For example, a user of the WMPT at the state, regional, or national-level can obtain data on mass of chemicals released to the environment and/or transferred in wastes from EPA's Toxics Release Inventory (TRI). Similarly, a user at a facility level may have facility-specific estimates of chemical concentrations in wastes derived from waste analysis data, that can be multiplied by waste quantity to obtain chemical mass estimates.

Unlike the other (PBT) factors used for scoring chemicals in the WMPT algorithm, the mass factor will require input data each time the tool is used; that is, there are no mass data "resident" in the tool. Thus, there is flexibility in the variety of data types or sources that can be used to score the mass factor, because use of a particular data type or source will depend on the specific user and/or application of the tool. It is important, however, that the same data type and source be used for scoring and ranking all chemicals in any given application of the tool (i.e., all mass data should be internally consistent within an application of the tool).

B.4.2 Mass Scoring Approach

Mass is used in the WMPT as a surrogate for potential exposure concentration. In turn, persistence and bioaccumulation potential are used as "modifiers" of the mass to reflect the way in which these physical/chemical characteristics affect a chemical's potential exposure concentration. In concept, mass is scored on a continuous, not categorical, scale such that there are no pre-defined high or low fencelines used to derive the mass factor score. Use of the continuous scale in this case allows more discrimination and does not "compress" the data. Persistence acts to retain available mass, consistent with the way a chemical's resistance to degradation increases its exposure potential. Similarly, bioaccumulation potential acts to increase available mass, consistent with the amplification of concentration of bioaccumulating chemicals in biological systems, and thus the increased exposure potential via food chain pathways.

In the underlying WMPT algorithm, mass is scored on a continuous logarithmic scale, with the score derived by taking half of the base 10 log of the pounds of a chemical present in wastes or released to the environment.

$$\text{Mass score} = \frac{\log_{10} \text{chemical mass (pounds per year)}}{2}$$

[2] Other measures of mass, such as concentration of a chemical in products or quantity of chemical used in industrial processes, can potentially be used in this context, but may be less relevant for a tool that focuses on wastes as generated or as released to the environment.

This approach is best illustrated with an example.

The WMPT user is prioritizing the emissions from a certain chemical plant in 1995. The amount of benzene emitted in that year was 4,586 pounds. This mass emitted is scored in the WMPT as follows:

$$\text{Mass score} = \log_{10}(\text{chemical mass in pounds}) / 2$$
$$= \log_{10}(4{,}586) / 2$$
$$= 1.83$$

The mass score for benzene in this case, therefore, is 1.83.

The log of the mass is divided by two so that one scale point covers two orders of magnitude of mass. The division by two is needed for the mass scale to be commensurate with the double order-of-magnitude toxicity and exposure scales, i.e., to make a mass score difference of 1 point (e.g., from 1 to 2) represent a two order-of-magnitude difference in mass. For example, 100 pounds would be scored as a 1 and 10,000 pounds would be scored as a 2. This is appropriate because, to be consistent with the general risk assessment equation, a hundred-fold increase in "exposure" (i.e., releasable mass) should have approximately the same impact on score as a hundred-fold increase in toxicity.

As shown in the flowchart for the WMPT algorithm, a mass score derived in this manner is then added to the P, B, and (human) T scores, to derive the Human Risk Potential score. Similarly, this same mass score is added to the P, B, and (ecological) T scores to derive the Ecological Risk Potential score.

APPENDIX C
SCORING HUMAN AND ECOLOGICAL TOXICITY

This appendix presents the WMPT scoring approach in regards to chemical toxicity, which is a key determinant of risk potential. Chemical toxicity is represented in the WMPT algorithm by the factors Human Toxicity and Ecological Toxicity. Section C.1 presents the human toxicity scoring rationale, and discusses the scoring elements, data quality hierarchies, and limitations. Section C.2 presents the ecological toxicity scoring approach and describes the data elements, data quality hierarchies, fencelines, and limitations.

A chemical's toxicity is a key determinant of its risk potential. The WMPT toxicity scoring approach emphasizes long-term or chronic toxicity; and the WMPT exposure component stresses bioaccumulation and persistence, both of which indicate the likelihood and potential magnitude of chronic exposure. Chemical toxicity is represented in the WMPT algorithm by two factors: (1) Human Toxicity and (2) Ecological Toxicity.

Toxicity

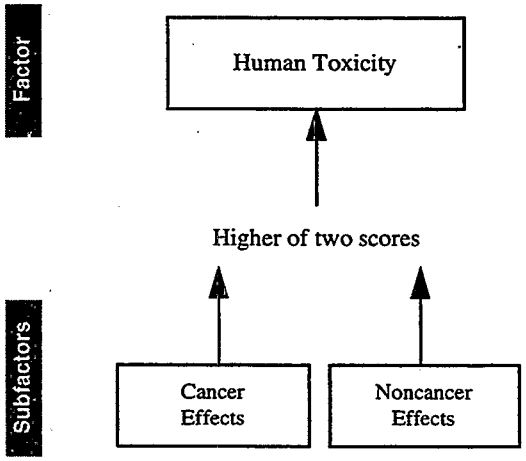
Toxicity is defined as the tendency of a chemical to produce adverse effects in organisms following exposure. Toxicity indicates, for a given exposure level, whether adverse effects might be expected and, if so, what kinds of effects can occur and how severe/reversible they might be.

Toxicity-related factors measure the potential for the chemical or waste to cause adverse effects to human and ecological receptors in the event of exposure, as well as the nature and severity of the adverse effects. Toxicity factors are often based on the relationship between the administered dose of a chemical and the incidence of adverse effects observed in the exposed population (i.e., a dose-response relationship). The data elements used to score human and ecological toxicity for WMPT chemical screening purposes are described in this appendix.

C.1 HUMAN TOXICITY

The Human Toxicity factor evaluates adverse effects to human health from chronic exposures. Human Toxicity is scored using two subfactors: (1) Cancer Effects and (2) Noncancer Effects. The Cancer Effects subfactor is assigned a score of 1 (low concern), 2 (medium concern), or 3 (high concern) by comparing indicators of a chemical's likelihood to cause cancer (e.g., cancer slope factors or potency factors) against specified fencelines. In addition, the weight-of-evidence associated with the cancer potency or slope factors is used in a decision-rule framework to select the relevant fencelines for scoring the cancer effects. The Noncancer Effects subfactor is scored by

EXHIBIT C-1
Human Toxicity Factor Scoring



comparing indicators of a chemical's potential to cause chronic noncancer effects such as reproductive or developmental abnormalities (e.g., EPA Reference Doses (RfDs), Reference Concentrations (RfCs)) to specified fencelines. The higher of the two subfactor scores becomes the Human Toxicity factor score, as illustrated in Exhibit C-1.

The chemical human toxicity score is based on toxicity indices from several EPA sources as well as experimental data value reported in the scientific literature. Exhibit C-2 lists the different data elements that may be used to score the Human Toxicity factor and indicates the data quality of each data element. Data quality is based on the amount of peer review that a particular study has undergone and not on the particular value of the study. Exhibit C-3 presents the total number of chemical in WMPT that were scored for human toxicity, the number of chemicals that were scored based on each individual data element in the Human Toxicity factor scoring hierarchy, and how many chemicals were scored at each data quality level. Numbers are presented for both the entire set of chemicals in WMPT (approximately 4,700) and the subset of chemicals on the Draft Prioritized Chemical List (PCL) (approximately 880). It should be noted that a chemical may have a value for more than one data element; therefore, the numbers and percentages in the first and third columns in the table do not add up to the totals.

If data elements of high quality are available, the highest of the scores based on these data is taken as the chemical score. If no data of high quality are available, then medium quality data are collected and again the highest score based on these data becomes the chemical score; if those are lacking, data of low quality are used. Some further, conservative judgments are applied when scoring a unique group of chemicals, the metals. In WMPT, metals are scored for human health concerns as they appear in the database as elemental metals, salts, or other species, except in some instances when data were extremely limited and so the elemental form was chosen as the basis for the overall score. Further, in those cases where data on a metal group are limited , the closest analog (through molecular adjustment) is chosen as the basis for scoring, unless a form of the metal is known to exhibit greater environmental toxicity than the chosen analog.

The highest quality human toxicity data elements are the EPA oral cancer slope factors (used with the EPA cancer classifications), RfDs, and RfCs. These data elements, and several others used in human toxicity scoring are available from EPA's Integrated Risk Information System (IRIS). The data in IRIS

EXHIBIT C-2
Human Toxicity Data Elements and Data Quality Hierarchy

Data Element	Data Quality
Reference Dose (RfD) Reference Concentration (RfC) Reportable Quantity (RQ) Threshold Planning Quantity (TPQ) Cancer Potency Slope Factor (q*) RQ Potency Factor	High
Chronic NOAEL Chronic LOAEL Subchronic NOAEL Subchronic LOAEL Cancer Weight-of-Evidence	Medium
Human Health Structure Activity Team Rank Chemical Category Human Toxicity Estimate TSCA §8(e) Submission	Low

EXHIBIT C-3
Frequency Distribution of Human Toxicity Factor Data Elements Used to Score Chemicals in WMPT

Data Element	All Chemicals (4,727 chemicals)		PCL Only (879 chemicals)	
	Number (Percentage) of Chemicals with Data Element	Number (Percentage) of Chemicals Scored Based on One or More Data Elements in Data Quality Category	Number (Percentage) of Chemicals with Data Element	Number (Percentage) of Chemicals Scored Based on One or More Data Elements in Data Quality Category
Total Number of Chemicals Scored for Human Toxicity	2,567 (54.3%)		879 (100%)	
Reference Concentration	79 (2%)	High Data Quality 868 (18.4%)	58 (7%)	High Data Quality 515 (58.6%)
Reference Dose	360 (8%)		292 (33%)	
Reportable Quantity	311 (7%)		188 (21%)	
Threshold Planning Quantity	381 (8%)		172 (20%)	
Cancer Potency Slope Factor	136 (3%)		120 (14%)	
RQ Potency Slope Factor	131 (3%)		105 (12%)	
Chronic Lowest Observed Adverse Effect Level	166 (4%)	Medium Data Quality 60 (1.3%)	144 (16%)	Medium Data Quality 26 (3.0%)
Chronic No Observed Adverse Effect Level	241 (5%)		195 (22%)	
Subchronic Lowest Observed Adverse Effect Level	0 (0%)		0 (0%)	
Subchronic No Observed Adverse Effect Level	4 (0.08%)		2 (0.2%)	
Cancer Weight-of-evidence	268 (6%)		188 (21%)	
Human Health Structure Activity Team Rank	715 (15%)	Low Data Quality 1,639 (34.7%)	397 (45%)	Low Data Quality 338 (38.5%)
Chemical Category Human Toxicity Estimate	2,041 (43%)		622 (71%)	
TSCA Section 8(e) Submission	223 (5%)		150 (17%)	

represent EPA's consensus scientific positions on potential adverse effects that may result from exposure to environmental contaminants (U.S. EPA, 1993). The data summarized in IRIS are used to support two of the four major steps of EPA's risk assessment process as described in the National Research Council's (NRC) 1983 publication, *Risk Assessment in the Federal Government: Managing the Process*. The NRC publication describes the risk assessment process as consisting of the following four major steps: hazard identification, dose-response evaluation, exposure assessment, and risk characterization. Similar to the intended use of this data by WMPT, IRIS data are commonly used to support the first two steps, hazard identification and dose-response evaluation. Combined with specific situational exposure assessment

information, the summary information in IRIS may be used as one source of evaluating potential health risks associated with chemicals (U.S. EPA, 1993).

The fencelines used to score the Noncancer Effects subfactor are presented in Exhibit C-5. The fencelines used to score the Cancer Effects subfactor are presented in Exhibit C-6.

C.1.1 Data Elements Used in Noncancer Effects Scoring, Including Data Sources

Reference Dose and Reference Concentration - High Quality

The reference dose (RfD) is an EPA estimate of the highest daily oral exposure to the human population, including sensitive subgroups, that is likely to be without appreciable risk of deleterious effects during a lifetime. RfDs are developed using an assessment method that assumes there is a dose below which no adverse affects will occur. (U.S. EPA, 1993) The reference concentration (RfC) is an analogous estimate of the inhaled air concentration for the human population likely to be without appreciable risk of deleterious effects during a lifetime. The RfC considers effects on the respiratory tract as well as systemic effects. Several adjustments related to the physical state of the chemical and the type of effect are used to scale the experimental RfC to human equivalent.

Both the RfD and RfC are found on either the Health Effects Assessment Summary Tables (HEAST) (U.S. EPA, 1994a) or in the Integrated Risk Information System (IRIS) (U.S. EPA, 1997). The former is a comprehensive list consisting almost entirely of provisional risk assessment information relative to oral and inhalation routes for chemicals of interest to Superfund, the Resource Conservation and Recovery Act (RCRA), and the EPA in general. Entries on HEAST are limited to chemicals that have undergone review, have the concurrence of individual Agency program offices and are supported by an Agency reference. This risk assessment information has not had enough review to be recognized as Agency-wide consensus information. Two exceptions are the chemicals on the National Ambient Air Quality Standards (NAAQS) and the Drinking Water Criteria Document (DWCD) series whose information is of extremely high quality and appears on HEAST. IRIS is the Agency's official repository of Agency-wide consensus chronic human health risk information. IRIS evaluations are conducted by the Agency's Work Group Review process that leads to internal Agency scientific consensus regarding the risk information on the chemical. Both IRIS and HEAST are available through the National Technical Information Service. IRIS is available on disk and is updated monthly within EPA and quarterly through the service; HEAST is available only in hardcopy and is updated annually.

The scoring fencelines for RfDs and RfCs are identical to those used to support the existing chemicals program by the Office of Pollution Prevention and Toxics' (OPPT) Use Clusters Scoring System (UCSS) (U.S. EPA, 1994b). The UCSS RfD and RfC thresholds were established to screen chemicals relative to one another by using the set of chemicals with RfDs and RfCs reported in IRIS and creating classifications of low, medium and high based on an approximate 1:2:1 distribution of the number of chemicals in this set. In addition, the RfD thresholds are identical to those used in the Toxic Release Inventory Risk Screening Guide (U.S. EPA, 1989a).

Reportable Quantity - High Quality

The reportable quantity (RQ) was derived from EPA's Reportable Quantities Database (U.S. EPA, 1994c). This database contains regulatory and technical data on more than 950 hazardous substances that are designated, or planned for designation under Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). The database was first developed in the early 1980s by EPA's Emergency Response Division (ERD). For each chemical in the database, test data is entered and assigned an underlying RQ code. The Technical Background Document to Support

EXHIBIT C-4
Human Toxicity Scoring Fencelines - Noncancer Effects

Data Element	Data Quality	Scoring Fencelines		
		High (3)	Medium (2)	Low (1)
Reference Dose (RfD)[1]	High	< 0.001 mg/kg/day	0.001 - 0.1 mg/kg/day	> 0.1 mg/kg/day
Reference Concentration (RfC)[1]	High	< 0.002 mg/m	0.002 - 0.2 mg/m	> 0.2 mg/m
Reportable Quantity (RQ)[1]	High	1, 10 lb	100, 1,000 lb	5,000 lb
Threshold Planning Quantity (TPQ)[2]	High	1, 10 lb	100, 500 lb	1,000, 10,000 lb
Chronic NOAEL	Medium	< 0.1 mg/kg/day	0.1 - 10 mg/kg/day	> 10 mg/kg/day
Chronic LOAEL	Medium	< 1 mg/kg/day	1 - 100 mg/kg/day	> 100 mg/kg/day
Subchronic NOAEL	Medium	< 1 mg/kg/day	1 - 100 mg/kg/day	> 100 mg/kg/day
Subchronic LOAEL	Medium	< 10 mg/kg/day	10 - 1,000 mg/kg/day	> 1,000 mg/kg/day
Human Health Structure Activity Team Rank	Low	High	Medium-high, Medium	Low-medium, Low
Chemical Category Human Toxicity Estimate	Low	3	2	1
TSCA §8(e) Submission	Low	3	2	1

[1] Scoring thresholds (*i.e.*, fencelines) were calculated using data collected through August 1994.
[2] Scoring thresholds were based on values in the Toxic Chemical Release Inventory Risk Screening Guide.

EXHIBIT C-5
Human Toxicity Scoring Fencelines - Cancer Effects

Data Element	Data Quality	Scoring Fencelines		
		High (3)	Medium (2)	Low (1)
If WOE = A then				
q_1^* (Cancer Potency)[1]	High	>1 /mg/kg/day	0.01 - 1 /mg/kg/day	< 0.01 /mg/kg/day
RQ Potency Factors[1]	High	> 10 /mg/kg/day	0.2 - 10 /mg/kg/day	< 0.2 /mg/kg/day
No q_1^* or RQ available	High	High	---	---
If WOE = B or no WOE available then				
q_1^* (Cancer Potency)[1]	High	> 1 /mg/kg/day	0.01 - 1 /mg/kg/day	< 0.01 /mg/kg/day
RQ Potency Factors[1]	High	> 10 /mg/kg/day	0.2 - 10 /mg/kg/day	< 0.2 /mg/kg/day
No q_1^* or RQ available (WOE = B only)	High	---	Medium	---
If WOE = C then				
q_1^* (Cancer Potency)[1]	High	> 10 /mg/kg/day	0.1 - 10 /mg/kg/day	< 0.1 /mg/kg/day
RQ Potency Factors[1]	High	> 80 /mg/kg/day	1 - 80 /mg/kg/day	< 1 /mg/kg/day
No q_1^* or RQ available	High	---	Medium	---

[1] Scoring thresholds (*i.e.*, fencelines) were calculated using data collected through August 1994.

Rulemaking Pursuant to CERCLA Section 102, Volumes 1, 2, and 3, describe the assignment process in detail (U.S. EPA, 1989b). The database contains the following data used in developing statutory RQs: aquatic toxicity, acute mammalian toxicity data (including oral, dermal, and inhalation routes of exposure), potential carcinogenicity, chronic toxicity, ignitability, and reactivity.

WMPT underlying RQ values were selected based on chronic toxicity test data and carcinogenicity test data from the Reportable Quantities Database. The underlying RQ values associated with chronic test data range from 10 to 5,000 pounds. The underlying RQ values associated with carcinogenic studies were entered in the database as high, medium, and low. To convert the carcinogenic underlying RQ data to a numerical scale consistent with the chronic toxicity test data, the high, medium, and low entries were converted to RQ values of 1, 10, and 100 pounds, respectively. The scoring thresholds for RQs are identical to those used to support the existing chemicals program by the OPPT's UCSS (U.S. EPA, 1994b). The UCSS RQ thresholds were established to screen chemicals relative to one another by using the set of chemicals in IRIS with both statutory RQs and RfDs reported. The scoring thresholds were calculated based on a 1:2:1 distribution. In addition, these thresholds are similar to the RQ thresholds used in the Toxic Release Inventory Risk Screening Guide (U.S. EPA, 1989a).

Threshold Planning Quantity - High Quality

Threshold Planning Quantities (TPQs) are the amounts of extremely hazardous substances present at a facility above which the facility's owner/operator must give emergency planning notification to the State Emergency Response Committee and the Local Emergency Planning Committee under the Superfund Amendments and Reauthorization Act Section 302 (U.S. EPA, 1987). The list of extremely hazardous substances which have TPQs was established by EPA to identify chemical substances that could cause serious and irreversible health effects from accidental releases. This extremely hazardous substances list was based on consideration of the inherent acute toxicity of a chemical. The physical and chemical properties of substances on the list were considered in establishing TPQs but were not used as criteria for including the chemical on the list. TPQs also take into account the tendency for chemicals (primarily liquid substances) to become airborne.

EPA developed chemical TPQ levels by considering all available LC_{50} and LC_{LO} values with exposure periods up to 8 hours or with no reported exposure period. The actual chemical TPQ values were developed using a dispersion/toxicity ranking method. This method allowed EPA to assign chemicals a TPQ using an index that accounts for both the chemical toxicity and the potential for the chemical to become airborne in an accidental release. The potential for a chemical to become airborne was assessed based on an evaluation of the chemical's physical state and volatility. These indices were then combined to determine a chemical ranking factor. This approach results in a relative ranking and assignment of each chemical to one of a series of TPQ categories, but does not give a measure of absolute risk. Chemicals with a low ranking factor, or the highest concern, were assigned a TPQ of 1 pound. EPA believes that the one pound quantity represents a reasonable lower limit for the most extremely hazardous substances on the list (U.S. EPA, 1987). Chemicals with the highest factor, or the lowest concern, were assigned a TPQ of 10,000 pounds to ensure that facilities handling bulk quantities of any extremely hazardous substance would be required to notify the State Commission. Between the 1 and 10,000 pound limits, chemicals were assigned to intermediate categories of 10, 100, 500, and 1,000 pounds based on order of magnitude ranges in the ranking factors. The intermediate categories were based on standard industrial container sizes between one and 10,000 pounds. TPQs were developed to provide a "first cut" for community emergency response planners. TPQs are not considered absolute levels above which the substances are dangerous and below which they pose no threat.

The WMPT scoring threshold for TPQs were based on the values in the Toxic Chemical Release Inventory Risk Screening Guide (U.S. EPA, 1989a) and are consistent with the methodology used by EPA to develop the TPQs. Extremely hazardous substances expected to pose the greatest risk to human health,

with a TPQ of 1 pound or 10 pounds, are assigned a high level of concern in WMPT. Chemicals expected to pose the least risk, with a TPQ of 1,000 or 10,000 pounds, are assigned a lower level of concern by WMPT. Chemicals with TPQs between the high and low ranges are assigned a WMPT concern of medium.

Effect Levels - Medium Quality

There are four elements of medium data quality as shown in Exhibit C-2. The chronic no observed adverse effects level (NOAEL) is the highest experimental dose at which there is no statistically significant increase in a toxicologically-important effect in an organism after exposure to an altered environment during a major portion of its lifetime. The chronic lowest observed adverse effects level (LOAEL) is the lowest dose in an experimental study at which a statistically- or biologically-significant adverse effect is seen in an organism after exposure to an altered environment during a major portion of its lifetime. Two subchronic levels are also considered. The subchronic NOAEL is the highest experimental dose at which there is no statistically significant increase in a toxicologically important effect in an organism after exposure to an altered environment over about 10 percent of its lifetime. Similarly, the subchronic LOAEL is the lowest dose in an experimental study at which a statistically- or biologically-significant adverse effect is seen in an organism after exposure to an altered environment over about 10 percent of its lifetime. When data is collected for the WMPT chemicals, both the lowest NOAEL and the lowest LOAELs are chosen to make a conservative screening estimate. Available effect level data elements are collected from HEAST (U.S. EPA, 1994a) and IRIS (U.S. EPA, 1997)

The scoring thresholds for these medium quality data elements are identical to those used to support the existing chemicals program by the OPPT's UCSS (U.S. EPA, 1994b), and were chosen using the limits established for the reference dose and multiplying by an average uncertainty factor to obtain correspondence with the IRIS reference dose data distribution. The average uncertainty factors are 100 for a chronic NOAEL, 1,000 for both the chronic LOAEL and subchronic NOAEL, and 10,000 for the subchronic LOAEL.

Human Health Structure-activity Team Rank - Low Quality

If there are no medium or high quality data available for a WMPT chemical, ratings from EPA's Structure-activity Team (SAT) are considered in human health hazard scoring. The SAT is a team of experts- scientists (chemists, biologists, and toxicologists), and information specialists - from EPA's OPPT. The function of the SAT is to evaluate the potential health effects, environmental effects, and environmental fate of chemicals through structure activity relationships (SAR). The SAT routinely predicts selected physical properties and potential environmental fate, and assesses the human health effects and environmental effects of chemicals for which there are little or no data, in support of EPA's new chemicals program (Arcos, 1983). In doing so, the members of the SAT rely on a variety of sources and methods: publicly available databases, EPA- generated confidential data, models, and professional judgement. The SAT was formed in 1979 to support EPA's new chemicals program mandated under Section 5 of TSCA, and in recent years, has reviewed over 2,500 new chemical substances per year (Wagner, 1996).

The SAT health assessment typically begins with a description of the potential for absorption through the skin, lungs, and gastrointestinal (GI) tract. A discussion of the potential for chemical reactivity and the metabolic pathway of the chemical is included in the SAT report if it is relevant to the health assessment. The health endpoints that are typically assessed are mutagenicity, oncogenicity, neurotoxicity, acute toxicity, systemic toxicity, developmental toxicity, and reproductive toxicity .

The health assessment portion of an SAT report identifies the health concerns, rationale, and an overall health concern level. The health concern levels are expressed as high, moderate, and low according to the following guidance:

- Chemicals receive a high concern designation if there is evidence of adverse effects in human populations, or conclusive evidence of severe effects in animal studies for any of the toxic endpoints listed above;

- Chemicals receive a moderate concern designation if there is suggestive evidence in animals of any of the toxic endpoints listed above, or if there is a close structural, functional, and/or mechanistic analogy to chemicals with known toxicity. For example, aromatic amines may receive a moderate concern for liver and blood effects or the methylene dianiline family may be presumed to elicit retinopathy (neurotoxicity) based on data available for the parent diamine.

- Chemicals not meeting the above criteria are generally assigned low concern classifications.

Human toxicity ratings based on SAT calls were transferred directly for any chemicals common to both WMPT and UCSS (U.S. EPA, 1994b). Concern levels for WMPT chemicals that have been reviewed by the SAT are assigned using the same methodology as other chemicals reviewed by the SAT. WMPT scoring thresholds are set equal to the SAT thresholds: a chemical with a high concern SAT rating is assigned a score of 3, indicating high concern, a chemical with a moderate concern SAT rating is assigned a score of 2, indicating medium concern,, and a chemical with a low concern SAT rating is assigned a score of 1, indicating low concern.

The SAT assessment methodology is used by many EPA offices, and has been applied to over 3500 existing chemicals. During the past year, SAT has evaluated approximately 60 chemicals to support two Office of Solid Waste hazardous waste listing efforts and over 50 chemicals for the Office of Air and Radiation as an early step in identifying replacements for chlorinated solvents and chlorofluorocarbons. The SAT is also evaluating 1500 chemicals added to pesticide products for the Office of Pesticide Programs. In addition, the SAT has interacted with the U.S. chemical industry to share the SAR principles routinely used in evaluating chemicals. Finally, the SAT recently participated in a joint study with the European Union to determine how well the SAR methods employed by the SAT work. This exercise found that the SAT was highly successful in identifying the potential human health effects of chemicals.

Rank Based on Chemical Category - Low Quality

If no data of high or medium quality are available, and no SAT call data are available for WMPT chemicals, the chemicals are classified in one of 150 categories developed by EPA to support the Existing Chemicals Program use of the UCSS (U.S. EPA, 1994b). The quantitative data needed to score UCSS chemicals for health hazard concerns were only available for a select number of chemicals. To allow scoring of UCSS chemicals with no available screening data, chemical categories ranked for human health hazard were developed from an independently derived chemical classification set that had supporting hazard data.

The UCSS chemical classification set was composed of chemicals from five sources. Any chemical that was part of EPA's IRIS database (U.S. EPA, 1997) and had a reference dose, reference concentration, or slope factor was included. In addition, any chemical that had a reportable quantity (RQ) listed on REGMAT, the regulated materials database available through CAS and developed by Alpha-Omega Software Systems, was also included. Any chemical with an RQ potency factor in EPA's

background document for CERCLA Section 102 rulemaking (U.S. EPA, 1989b) was included, as were chemicals with past SAT ratings (if not protected as confidential under TSCA).

A classification set of 1632 chemicals was divided into categories based primarily on structure. Most of the category names reflect a chemical structural feature such as alcohol or ketone. Large categories were subcategorized based on more specific structural criteria, for example alcohols were divided into: chemicals with greater than eight carbon atoms, primary alcohols with one to four carbons, primary or branched alcohols with five to eight carbons, and the remainder into the not elsewhere classified subcategory. Several categories reflect the function that the chemical serves and were derived from EPA's new chemicals program classification. Examples of these categories include chelators, anionic surfactants, and chlorine sources. To the extent possible, each classification set chemical was placed in the smallest category possible. For example, a chemical would be placed in the more specific acetanilide category, if possible, rather than the amide category. In all, over 150 categories were developed to classify over 900 UCSS chemicals.

Scores were assigned to the categories based on the health hazard data available for member chemicals. When deciding on a score, the data available from peer reviewed sources, IRIS, and the RQ database were considered first. If these data were not available, then scores based on past SAT calls were used. Data from over 1,400 SAT reports were used in this analysis. In each case, the range of the data for the member chemicals in the categories were studied. If a natural division in hazard levels was apparent within a category, the sample member chemicals were subdivided further, if possible, based on the structure and hazard levels associated with the divisions. The rank assigned to the reference dose range, the reference concentration range, the reportable quantities and the slope factor were based on the ranges used in EPA's UCSS (U.S. EPA, 1994b) along with professional judgement. For example, the acrylonitrile category has three chemicals members whose SAT ratings range from 2 to 3 for human health. The conservative value of 3, or high concern, was assigned as the human toxicity rating for this category.

UCSS chemicals were classified into one of the 150 categories developed using the methodology described above based on structure, and assigned the human toxicity score associated with that category. If a chemical fit equally well within two categories, the category with the higher human toxicity rank was chosen as the chemical score.

WMPT human toxicity ratings based on category assignments were transferred directly for any chemicals common to both WMPT and UCSS. The category thresholds were also transferred directly from the UCSS and are similar to those used for SAT call assignments; a chemical with a high SAT concern was assigned a score of 3, indicating high WMPT concern, a chemical with a moderate SAT concern rating was assigned a score of 2, indicating medium WMPT concern, and a chemical with a low SAT concern is assigned a score of 1, indicating low WMPT concern.

TSCA §8(e) Submission - Low Quality

Under TSCA §8(e) companies must report to EPA information that "reasonably supports" a conclusion of substantial risk for any chemical substance or mixture they manufacture, process or distribute in commerce. When EPA receives this information, it is submitted to an initial hazard screening review and assigned a high-, medium-, or low-level of concern. These values are interpreted in WMPT in the same manner as the SAT values are, with a high assigned a value of 3, a medium assigned a value of 2, and a low assigned a value of one. The strengths of the §8(e) submissions are the inclusion of additional information about the chemical in question. The weakness of the §8(e) submission is that it is based on information submitted and may not address the complete range of toxic effects.

C.1.2 Data Elements Used in Cancer Effects Subfactor Scoring, Including Data Sources

The first step in scoring a cancer effect is to determine if a cancer weight-of-evidence (WOE) exists for the chemical. Weight-of-evidence categories available from IRIS (U.S. EPA, 1997) include Group A (known human carcinogen--evidence in humans is sufficient), Group B (probable human carcinogen--evidence in humans is limited or inadequate but animal evidence is sufficient), Group C (possible human carcinogen--inadequate or no evidence in humans and animal evidence is limited), Group D (unclassifiable), and Group E (evidence of non-carcinogenicity for humans). Each carcinogen assessment in IRIS is based on an EPA document that has undergone external peer review (U.S. EPA, 1993).

Carcinogen classifications available from the International Agency for Research on Cancer (IARC) were also incorporated into WMPT (HSDB, 1997). IARC carcinogen classifications are as follows: 1 (human carcinogen), 2A (probable human carcinogen-limited human evidence), 2B (possible human carcinogen), 3 (not classifiable), and 4 (probably not carcinogenic). IARC carcinogen classifications were assigned a corresponding WOE as shown in Exhibit C-6.

EXHIBIT C-6
IARC and EPA WOE Cancer Classifications

IARC Classification	EPA WOE Classification
1	A
2A	B
2B	C
3	D
4	E

If no WOE is available for the chemical, but slope factor or RQ potency data are available, the chemical is assigned a WOE of B. Once the weight-of-evidence has been established, the scoring thresholds as shown in Exhibit C-3 can be applied to the data elements discussed below.

Slope Factor (q_1^*) - High Quality

Cancer effects are scored on the basis of the slope factor (q_1^*) or the RQ potency factor, both of which are considered high quality data elements. For cancer risk assessment, EPA has developed standard methods for predicting the incremental lifetime risk of cancer resulting from exposure to a chemical. EPA generally uses a linearized multistage model of carcinogenesis to quantitatively model the dose-response function of a carcinogen. The upper-bound linear term of this model is called the q_1^*. The higher the value is for q_1^*, the higher the carcinogenic potency. Data for the slope factor is found in either HEAST (U.S. EPA, 1994a) or IRIS (U.S. EPA, 1997).

The WMPT slope factor scoring thresholds are identical to those used to support the use of the UCSS for the OPPT's existing chemicals program UCSS (U.S. EPA, 1994b). The UCSS slope factor scoring thresholds were established to screen chemicals relative to one another by combining the set of chemicals on IRIS having reported slope factors with a database of 80-90 chemicals and analogs that was

developed for EPA's new chemicals program for cancer risk assessment. The chemicals in the combined data set were ordered by potency; thresholds were calculated assuming a 1:2:1 distribution.

RQ Potency - High Quality

The RQ potency factor is based on a multistage dose response model using quantitative evidence from animal studies to derive an estimated dose for a 10 percent lifetime cancer risk (ED_{10}) for animals. The potency factor for humans (RQ Potency Factor) is derived by EPA from the animal RQ factor by applying a multiplier based on the relative weights of animals and humans. The higher the factor, the higher the likelihood of cancer. The potency values are found in EPA's background document for CERCLA Section 102 rulemaking (U.S. EPA, 1989b).

The WMPT RQ potency scoring thresholds are identical to those used to support the existing chemicals program by the OPPT's UCSS (U.S. EPA, 1994b). The UCSS RQ potency scoring thresholds were established to screen chemicals relative to one another by examining the set of chemicals on IRIS for which both q_1^* and RQ potency values were reported. The RQ potency scoring thresholds were set based on a 1:2:1 distribution.

No Slope Factor (q_1^*) or RQ Potency Data, WOE Available - High Quality

If a chemical has been assigned a WOE of A, B, or C, but no slope factor or RQ potency data are available, the chemical will be assigned a WMPT cancer effect score based upon the chemical's WOE. If the chemical has a WOE of A, it will be assigned a high score. If the chemical has a WOE of B or C, it will be assigned a medium score.

No WOE Available, Slope Factor (q_1^*) or RQ Potency Available - High Quality

If a chemical is assigned a slope factor or RQ potency factor, but no WOE is available, the chemical WOE is set to B. The WMPT cancer effect score for the chemical is then assigned based on the slope factor and RQ potency factor scoring thresholds shown in Exhibit C-3 for WOE equal to B.

C.1.3 Human Toxicity Limitations

WMPT human toxicity scoring primarily considers chronic endpoints as well as potential cancer effects using data from short-, medium, and long-term studies. Focusing on these aspects and test results may not encompass all important potential exposure pathways and the associated potential toxic effects. A number of other types of potential human toxicity, such as teratogenicity, mutagenicity, and immunotoxicological effects, are not given equal consideration within WMPT. This is primarily due to data limitations and the Agency focus in recent years on assessing cancer endpoints.

C.1.4 Human Toxicity References

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C.2 ECOLOGICAL TOXICITY

The WMPT Ecological Toxicity factor evaluates a chemical's potential to cause an adverse effect on an ecosystem. Although ecological toxicity can be measured and evaluated for both aquatic and terrestrial ecosystems, the WMPT scoring approach currently addresses only a chemical's aquatic toxicity. Thus, the Ecological Toxicity factor has only one subfactor contributing to its score—the Aquatic Toxicity subfactor.

A chemical's aquatic toxicity, like ecological toxicity, can be evaluated at the organism, population, community, and ecosystem levels. Aquatic toxicity can be assessed for different exposure durations (e.g., short term, long term) and for different ecosystem types (e.g., freshwater or saltwater).

Ecological Toxicity

Ecological toxicity is defined as the ability of a chemical or chemical mixture to cause an adverse effect in an ecosystem. An ecosystem is defined as the biological community and its non-biological environment within a specified location in space and time (e.g., a freshwater lake, a desert, a wetland area). Chemical effects on ecosystems can be measured by assessing causal changes in individual organisms (e.g., mortality, developmental abnormalities), changes in populations of organisms (e.g., decreased abundance or density of the population), changes in communities of different species (e.g., altered community structure), and changes in the ecosystem itself (e.g., altered species diversity, changes in nutrient cycling).

A chemical's Aquatic Toxicity subfactor is scored based on data for the chemical's toxicity to freshwater or saltwater organisms. Toxicity data for longer term or chronic exposure are used preferentially; however, short term or acute toxicity data may be used for chemicals that lack or have incomplete chronic data. The specific data elements and the data quality hierarchies used to score the Aquatic Toxicity subfactor are described in section C.2.1. The Ecological Toxicity factor scoring approach is described in section C.2.2. Limitations associated with the Ecological Toxicity factor scoring approach and data are presented in section C.2.3. Section C.2.4 lists the references cited in section C.2.

Aquatic Toxicity

Aquatic toxicity is defined as the ability of a chemical or chemical mixture to cause an adverse effect in an aquatic ecosystem. Aquatic ecosystems can be freshwater (e.g., pond, river), saltwater (e.g., ocean), or estuarine (e.g., bay).

C.2.1 Data Elements, Sources of Data, and Data Quality Hierarchies

A chemical's Aquatic Toxicity subfactor is scored based on one of 12 different data elements. Exhibit C-7 lists the Aquatic Toxicity subfactor data elements in order of decreasing data quality. The remainder of this section describes each data element and, if required, the hierarchy of sources for data elements.

Because the WMPT exposure scoring focuses on chronic risks, chronic measures of aquatic toxicity are used preferentially for scoring. For chemicals that lack or have incomplete chronic toxicity data, acute toxicity data may be used in one of two ways: (1) measured acute toxicity data are used in

EXHIBIT C-7
Aquatic Toxicity Subfactor Data Elements and Data Quality Hierarchy

Data Element	Units	Data Quality Level
Sediment Quality Final Chronic Value (FCV) Tier I	mg/L (ppm)	Highest
Great Lakes Water Quality Initiative (GLWQI) FCV Tier I	mg/L (ppm)	Highest
National EPA Ambient Water Quality Criterion (AWQC) FCV	mg/L (ppm)	Highest
Secondary Chronic Value (SCV)	mg/L (ppm)	High
Measured Chronic Value/Estimated Chronic Value Based on a Chemical Class- and/or Species-specific Acute-to-Chronic Ratio	mg/L (ppm)	High
Great Lakes Water Quality Initiative Tier I Final Acute Value	mg/L (ppm)	Medium
National AWQC Criterion Maximum Concentration	mg/L (ppm)	Medium
Aquatic Toxicity Reportable Quantity (RQ)	pounds	Low
Measured Acute Value (LC_{50} or EC_{50})	mg/L (ppm)	Low
Predicted Chronic Value Based on Structure-Activity Relationships (SARs)	mg/L (ppm)	Lowest
Predicted Acute Value (LC_{50} or EC_{50})	mg/L (ppm)	Lowest

conjunction with a chemical class- and/or species-specific acute-to-chronic ratio to estimate a chronic value; or (2) measured acute toxicity data are compared against "acute toxicity" fencelines that, in effect, predict chronic values by assuming an acute-to-chronic ratio of 10, which is not a chemical class- and species-specific acute-to-chronic ratio (see the discussion of acute aquatic toxicity fencelines in section C.2.2). Rather than converting all of the available acute values to estimated chronic values and presenting the predicted chronic values in the WMPT database, U.S. EPA chose to use the acute aquatic toxicity fenceline approach to maintain transparency and to distinguish between the "higher quality" chronic values that were estimated based on chemical class- and/or species-specific acute-to-chronic ratios from the "lower quality" chronic values that are not estimated based on chemical class- and species-specific acute-to-chronic ratios. Predicting chronic values based on acute aquatic toxicity values and acute-to-chronic ratios is a practice utilized by many U.S. EPA offices for aquatic toxicity characterization (e.g., for Office of Water's (OW) Great Lakes Water Quality Initiative (GLWQI) and Ambient Water Quality Criteria (AWQC) development, OPPT's review of new and existing chemicals). The WMPT Aquatic Toxicity subfactor data quality hierarchy also specifies that valid measured data are, in general, preferred to predicted data.

In general, elemental metals are scored for aquatic toxicity based on data for the highest scoring salt or species of the metal. If high quality data are available for several species of a given metal (e.g., FCVs for chromium(VI) and chromium(III)), the metal species are scored as well. This simplified approach is consistent with other risk screening tools of this type. As discussed in Chapter 1, WMPT is designed to be a simple screening approach to convey as much information about potential risk associated with chemicals in wastes without more detailed information on management, location, and exposure. To make predictions about metal speciation would require this more detailed information, as well as more sophisticated risk screening tools.

Exhibit C-8 summarizes the total number of chemicals in WMPT that were scored for aquatic toxicity, how many were scored based on each individual data element in the Aquatic Toxicity subfactor scoring hierarchy, and how many were scored at each data quality level. Numbers are presented in the exhibit for both the entire set of chemicals evaluated (approximately 4,700) and the subset of chemicals on the Draft PCL (approximately 880). The measures are listed in order of higher to lower quality. It should be noted that a chemical may have a value for more than one data element; therefore, the numbers and percentages in columns one and three in the table do not add up to the totals.

Final Chronic Value

A Final Chronic Value (FCV) is a measure of chronic aquatic toxicity. An FCV is the highest four-day average concentration of a chemical in water that should not cause unacceptable toxicity to fish and aquatic invertebrates during a long-term exposure (U.S. EPA, 1986). FCVs have been used by U.S. EPA to derive national chronic Sediment Quality Criteria (SQC), Great Lakes Water Quality Initiative (GLWQI) Tier I aquatic life criteria, and Ambient Water Quality Criteria (AWQC). U.S. EPA's methodology to calculate FCVs specifies minimum data requirements (e.g., measured toxicity data for aquatic species representing at least eight different families, acute-to-chronic ratios for aquatic species in at least three different families of fish and invertebrates). Thus, FCVs are designated as the highest quality data elements used to score the Aquatic Toxicity subfactor.

The primary reason why FCVs are used rather than the actual chronic AWQC or GLWQI chronic aquatic life criteria is that, for some chemicals (e.g., DDT, dieldrin, endrin, heptachlor, methyl mercury, and PCBs), the chronic AWQC may not be based on the chemical's hazard to aquatic organisms, but instead on human fish consumption concerns. In these cases, the chronic AWQC have been derived based

EXHIBIT C-8
Frequency Distribution of Aquatic Toxicity Subfactor Data Elements Used to Score Chemicals in WMPT

Data Element	All Chemicals (4,727 chemicals)		PCL Only (879 chemicals)	
	Number (Percentage) of Chemicals with Data Element	Number (Percentage) of Chemicals Scored Based on One or More Data Elements in Data Quality Category	Number (Percentage) of Chemicals with Data Element	Number (Percentage) of Chemicals Scored Based on One or More Data Elements in Data Quality Category
Total Number of Chemicals Scored for Aquatic Toxicity	1,260 (26.7%)		879 (100%)	
Sediment Quality FCV Tier I	5 (0.11%)	Highest Data Quality 46 (1.0%)	4 (0.5%)	Highest Data Quality 31 (3.5%)
GLWQI FCV Tier I	13 (0.28%)		11 (1%)	
National AWQC FCV	41 (1%)		28 (3%)	
SCV Derived Based on GLWQI Tier II Methodology	52 (1%)	High Data Quality 190 (4.0%)	47 (5%)	High Data Quality 164 (18.7%)
Measured Chronic Value/Estimated Chronic Value Based on a Chemical Class- and/or Species-specific Acute-to-Chronic Ratio	178 (4%)		152 (17%)	
GLWQI Tier I FAV	13 (0.28%)	Medium Data Quality 0 (0%)	12 (1%)	Medium Data Quality 0 (0%)
National AWQC CMC	28 (1%)		23 (3%)	
Aquatic Toxicity Reportable Quantity (RQ)	374 (8%)	Low Data Quality 861 (18.2%)	210 (24%)	Low Data Quality 544 (61.9%)
Measured Acute (LC_{50} or EC_{50})	813 (17%)		623 (71%)	
Predicted Chronic Value Based on SARs	159 (3.4%)	Lowest Data Quality 163 (3.4%)	135 (15%)	Lowest Data Quality 140 (15.9%)
Predicted Acute Value (LC_{50} or EC_{50})	51 (6%)		47 (5%)	

on levels that would result in an exceedence of a Food and Drug Administration action level for fish consumed by humans, rather than the FCV for the protection of aquatic organisms. The use of an FCV as the highest quality data element is consistent with other U.S. EPA OSW endeavors (e.g., the *Hazardous Waste Identification Rule: Risk Assessment for Ecological Receptors* (U.S. EPA, 1995a)), and OW's data quality hierarchy for the GLWQI and the derivation of the Draft Sediment Quality Advisory Levels (U.S. EPA, 1993, 1996a, 1996d). FCVs were also presented as high quality data elements in U.S. EPA's Office of Emergency and Remedial Response's (OERR) compilation of Ecotox Thresholds for the Superfund program (U.S. EPA, 1996b).

U.S. EPA Chronic Values for Aquatic Toxicity

Final Chronic Value (FCV): the highest four-day average concentration of a chemical in water that should not cause unacceptable toxicity during a long-term exposure (U.S. EPA, 1986).

Secondary Chronic Value (SCV): an estimated average concentration of a chemical in water that should not result in "unacceptable adverse effects" on aquatic organisms exposed for long-term durations (i.e., greater than four days). SCVs are derived based on the GLWQI Tier II methodology, which has even less rigorous data requirements than the methodology used to calculate FCVs.

Since 1980, U.S. EPA has calculated FCVs to derive chronic SQC, GLWQI Tier I aquatic life chronic criteria, and AWQC. FCVs developed more recently were judged to be higher quality because these FCVs should reflect more recent data and measurement methods. Therefore, the data quality hierarchy specifies that FCVs developed more recently should be used before FCVs calculated earlier. The FCVs used in the development of the SQC are the most recently developed FCVs. The FCVs developed for the GLWQI Tier I aquatic life chronic criteria are slightly older. The FCVs used to develop the national chronic AWQC in the 1980s are the oldest. Thus, the data quality hierarchy for the Aquatic Toxicity subfactor specifies that the SQC FCV for a chemical should be used over any other aquatic toxicity measure. The GLWQI Tier I FCVs should be used, if no SQC FCV is available. The AWQC FCVs should be used, if an SQC FCV or a GLWQI Tier I FCV is not available. This data source selection hierarchy for FCVs is consistent with the FCV selection approach used in U.S. EPA OSW's *Hazardous Waste Identification Rule: Risk Assessment for Ecological Receptors* (U.S. EPA, 1995a) and the approach used by OERR to compile the Ecotox Thresholds for the Superfund program (U.S. EPA, 1996b).

Secondary Chronic Value

For the GLWQI, U.S. EPA developed a Tier II methodology to derive Secondary Chronic Values (SCVs). Similar to an FCV, an SCV is an estimated average concentration of a chemical in water that should not result in "unacceptable adverse effects" on aquatic organisms exposed for long-term durations (i.e., greater than four days). The Tier II methodology, however, has even less rigorous data requirements than the methodology used to calculate the Tier I FCVs. The Tier II methodology uses statistically derived "adjustment factors" to calculate an SCV (40 CFR 132 Appendix A). The SCV also has minimum data requirements (e.g., the data set must include a daphnid test and meet specified acceptability criteria). Therefore, SCVs are designated as being lower quality than the FCVs, but higher than any of the remaining aquatic toxicity data elements. This data quality hierarchy is consistent with those used by OSW for the HWIR Ecological Risk Assessment (U.S. EPA, 1995a), by OERR for the development of the Ecotox Thresholds for the Superfund program (U.S. EPA, 1996b), and by OW for the GLWQI and the derivation of the Draft Sediment Quality Advisory Levels (U.S. EPA, 1993, 1996d).

SCVs have been calculated for several U.S. EPA efforts. OSW derived SCVs for the HWIR Ecological Risk Assessment (U.S. EPA, 1995a). OW developed SCVs for the GLWQI secondary criteria and for the Draft Sediment Quality Advisory Levels (U.S. EPA, 1993, 1996a, 1996d). OERR calculated

SCVs for the Ecotox Thresholds project (U.S. EPA, 1996b). The SCVs presented in the WMPT database were compiled from these sources. No overlap occurred between the chemicals addressed by these projects; thus, a data source selection hierarchy was not necessary.

Measured Chronic Values/Predicted Chronic Values Based on a Chemical Class- and/or Species-specific Acute-to-Chronic Ratio

An aquatic toxicity "chronic value" is a threshold concentration of a chemical in water at which statistically significant effects on an aquatic test population's survival, growth, or reproduction are expected to occur (Suter, 1993). Chronic values can be calculated directly from experimental toxicity test data (i.e., the concentration-effect relationship for the chemical or the concentration-effect curve for the chemical) or predicted using (1) acute data and acute-to-chronic ratios, and (2) structure-activity relationships.

"Measured" chronic values are calculated directly from results of chronic toxicity tests performed in a laboratory or in the field. The WMPT database includes the following measured chronic aquatic toxicity values:

- Median effect concentration (EC_{50}) measured for a chronic or long-term duration;
- Chronic EC_{10};
- Median lethal concentration (LC_{50}) measured for a chronic duration; and
- Geometric mean maximum acceptable toxicant concentration (GMATC) for the most sensitive species.

The aquatic toxicity endpoints EC_{50}, EC_{10}, LC_{50}, NOEC, LOEC, and GMATC are defined in the text box below. The chronic values must be determined for long-term durations as specified in Exhibit C-9.

Measured chronic values have been used by (1) OW to derive AWQC and Great Lakes Water Quality Criteria, and (2) OPPT to evaluate hazard of new industrial chemicals under Section 5 of the Toxic Substances Control Act (TSCA) and to develop the Toxics Release Inventory (TRI) expansion list. Measured chronic values were also used in a number of OPPT screening efforts (e.g., hazard screening of the Superfund Amendments and Reauthorization Act (SARA) Section 313 initial list).

Chronic values can also be predicted for a chemical by dividing a measured acute value by an acute-to-chronic ratio for a similar chemical (or the chemical class to which the chemical belongs) and similar species. The acute-to-chronic ratio is the ratio of the acute value and the chronic value for an aquatic species. The premise is that, for chemicals that have a measured acute value, but no chronic value, for a particular species, an acute-to-chronic ratio for a similar chemical or chemical class and species can be used to predict the chronic value for that species.

The measured acute values used here to predict chronic values differ from the measured acute values presented later in this appendix because the former had chemical class- and/or species-specific acute-to-chronic ratios readily available in OPPT's environmental toxicity profiles. Chronic values predicted based on measured acute data and chemical class- and/or species-specific acute-to-chronic ratios are designated in WMPT as higher data quality than chronic values that are estimated based on an assumed acute-to-chronic ratio of 10 (the acute-to-chronic ratio for the neutral organics chemical class) because the former are less likely to over or under predict the chronic toxicity of a chemical.

Aquatic Toxicity Endpoints

The following standard aquatic toxicity endpoints can be measured experimentally or predicted with structure activity relationships.

Median effect concentration (EC_{50}): The exposure concentration of a substance in water that is estimated to be effective in producing some sublethal response (e.g., behavioral effects) in 50 percent of the test population. The EC_{50} is usually expressed as some time dependent value (e.g., 24-hour EC_{50}) (U.S. EPA, 1996c).

Ten Percent Effect Concentration (EC_{10}): The exposure concentration of a substance in water that is estimated to be effective in producing some sublethal response in 10 percent of the test population..

Median lethal concentration (LC_{50}): A statistically or graphically estimated aqueous concentration of a chemical that is expected to be lethal to 50 percent of a group of organisms under specified conditions (U.S. EPA, 1996c).

No Observed Effect Concentration (NOEC): The highest concentration of a chemical in water evaluated in an aquatic toxicity test that causes no statistically significant difference in effect compared with controls (U.S. EPA, 1996b).

Lowest Observed Effect Concentration (LOEC): The lowest level of a chemical in water evaluated in an aquatic toxicity test that has a statistically significant effect on the exposed organisms compared with control organisms (U.S. EPA, 1996c).

Geometric Mean Maximum Acceptable Toxicant Concentration (GMATC): The geometric mean of the NOEC and the LOEC. The geometric mean is the Nth root of the product of the N numbers. For example, the geometric mean of two numbers is the square root of the product of the two numbers or antilog of the the arithmetic average of the logarithms of the two numbers.

Chronic values predicted based on chemical class- and/or species-specific acute-to-chronic ratios are considered by the WMPT system to be of equal data quality as the measured chronic values. Thus, attempts were made to evaluate a chemical's measured chronic values and those chronic values predicted based on chemical class- and/or species-specific acute-to-chronic ratios. If no other higher quality aquatic toxicity data element existed for a chemical, then the lowest chronic value of either the measured chronic values or the estimated chronic values was used to score the chemical for aquatic toxicity. This approach of evaluating measured chronic values and estimated chronic values as equal data quality is consistent with the approach used to derive AWQC Final Chronic Values (U.S. EPA, 1986). This approach also attempts to ensure that the chronic value used by the WMPT to score the chemical represents the most sensitive species. If measured chronic values were always selected ahead of estimated chronic values, the most sensitive species may not be addressed, because for some chemicals, only acute data for the most sensitive species may be available.

Chronic values were extracted from readily available compilations of GMATCs, chronic EC_{50}s, chronic EC_{10}s, chronic LC_{50}s, and chronic values predicted based on chemical class . These sources included the following databases, listed in order of preference:

- Chronic values compiled in OPPT's environmental toxicity profiles for existing chemicals;

- Chronic values compiled for OPPT's environmental toxicity evaluations of the TRI expansion list;
- OPPT's screening of the SARA Section 313 initial list; and
- Office of Research and Development's (ORD) Aquatic Information Retrieval (AQUIRE) database.

Except for the chronic values taken from OPPT's environmental toxicity profiles and the TRI expansion list hazard evaluations, the measured chronic values in WMPT are based on a limited review of available aquatic toxicity data. The AQUIRE data compiled for WMPT and the AQUIRE data used in OPPT's screening of the SARA Section 313 initial list were subject to only minimal quality requirements (e.g., the documentation code for the chronic value had to be "complete"). Only the test duration reported in AQUIRE was reviewed to ensure that the chronic value selected was indeed a chronic endpoint. No other test parameters were reviewed. This is an important limitation for these data because certain toxicity test parameters (e.g., water hardness, temperature, total organic carbon, humic acid, and pH) can affect the aquatic toxicity of a chemical. In contrast, OPPT's environmental toxicity profiles and the TRI expansion list hazard evaluations confirmed that the chronic value's test parameters met some standard requirements; therefore, these data sources were preferred to the others.

EXHIBIT C-9
Chronic Aquatic Toxicity Test Durations

Species	Duration
Fish - cold water (e.g., trout, salmon)	90 to ≥ 120 days
Fish - warm water (e.g., fathead minnow, bluegill, bass)	30 to ≥ 90 days
Daphnids (water flea)	14 to 21 days (3 broods)
Green algae	3 to 4 days
Chironomids (e.g., midge, mayfly, stonefly)	28 days (complete emergence)
Mysids/shrimp	21 days
Scud (gamarus)	21 days
Aquatic plants (e.g., Duckweed)	28 days

Source: U.S. EPA, 1997

Great Lakes Water Quality Initiative Tier I Final Acute Value

U.S. EPA OW has proposed for the GLWQI Tier I aquatic life criteria which, if not exceeded in the Great Lakes System, will protect fish, invertebrates, and other aquatic life from adverse effects from that chemical. A Tier I GLWQI Final Acute Value (FAV) is used to derive a GLWQI acute criterion, referred to as a Criterion Maximum Concentration (CMC) for the chemical. The FAV is calculated using one of the following two methods: (1) the estimated concentration of a chemical corresponding to the lower 95th percentile of all of the measured acute values that have been conducted for the chemical, or (2) the mean acute value for commercially or recreationally important species. The method that yields the lowest concentration is used to determine the FAV. Acute values used include median effect

concentrations (EC_{50}s) and median lethal concentrations (LC_{50}s). See the text box on page 19 for definitions of these endpoints.

In WMPT, when chronic toxicity data are not available for a chemical, acute toxicity data are used in conjunction with acute aquatic toxicity fencelines to score the Aquatic Toxicity subfactor (see discussion of acute aquatic toxicity fencelines in section C.2.2). The GLWQI FAV is designated as medium data quality among all of the chronic and acute data elements combined (see Exhibit C-7). The GLWQI FAVs are designated medium quality because U.S. EPA derived these values more recently than the national acute AWQC. Also, for the FAV to be derived, a rigorous set of data requirements were met (e.g., data for species from at least eight different families have to be available, tests had to be conducted using "acceptable procedures").

U.S. EPA Acute Values for Aquatic Toxicity

GLWQI Final Acute Value (FAV): The FAV is calculated using one of the following two methods: (1) the estimated concentration of a chemical corresponding to the lower 95th percentile of all of the measured acute values that have been conducted for the chemical, or (2) the mean acute value for commercially or recreationally important species.

AWQC Criterion Maximum Concentration (CMC): an estimate of the highest 1-hour average chemical concentration that should not result in "unacceptable effects on aquatic organisms and their uses." (U.S. EPA, 1986)

National AWQC Criterion Maximum Concentration

U.S. EPA has calculated national acute AWQC. An acute or short-term AWQC is called a Criterion Maximum Concentration (CMC). The CMC is an estimate of the highest 1-hour average chemical concentration that should not result in "unacceptable effects on aquatic organisms and their uses" (U.S. EPA, 1986). CMCs have been derived for both freshwater and saltwater ecosystems. Where both saltwater and freshwater CMCs were available, the lower of these two values was selected. The national CMCs in WMPT were extracted from U.S. EPA's draft list of national AWQC (U.S. EPA, 1995b).

If a chemical does not have a GLWQI FAV, then the national CMC for the chemical, if available, is used. The GLWQI FAVs are designated as higher quality data than the national AWQC because, although the GLWQI FAVs are derived using nearly identical methodologies, the GLWQI FAVs were developed more recently than the national CMCs.

National AWQC CMCs have been used to score a chemical ecological toxicity in number of other ranking systems, including OPPT's Use Clusters Scoring System (UCSS) (U.S. EPA, 1994).

Aquatic Toxicity Reportable Quantity

Under Section 102 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), U.S. EPA has established Reportable Quantities (RQs) for listed hazardous substances. An RQ is an amount, generally in pounds, for a listed hazardous substance. If a listed hazardous substance is released to the environment in an amount that equals or exceeds the RQ, the incident must be reported to the National Response Center (NRC). Six primary criteria are examined to derive the RQ: aquatic toxicity, acute mammalian toxicity, chronic toxicity, potential carcinogenicity, ignitability, and reactivity. An underlying reportable quantity is developed for each of these criteria, depending on available data, and the lowest of these underlying reportable quantities becomes the RQ. The underlying reportable quantity that is derived based on aquatic toxicity (i.e., the aquatic toxicity reportable quantity) is determined based on the measured lowest acute 96-hour LC_{50} for the listed hazardous substance (U.S. EPA, 1985).

WMPT uses the underlying aquatic toxicity reportable quantity to score a chemical's Aquatic Toxicity subfactor, if no other higher quality data are available for the chemical. Like the RQ, the aquatic toxicity reportable quantity units are pounds. For the WMPT database, aquatic toxicity reportable quantities were obtained from databases compiled for OPPT's hazard screening of the SARA Section 313 initial list and OERR's Reportable Quantities database.

Measured Acute LC_{50} or EC_{50}

If no higher quality data are available for a chemical, measured acute aquatic toxicity LC_{50} or EC_{50} values are used in conjunction with acute aquatic toxicity fencelines to score a chemical's Aquatic Toxicity subfactor (see discussion in section C.2.2). Refer to page 19 for general definitions of LC_{50} and EC_{50} aquatic toxicity endpoints. Acute LC_{50}s and EC_{50}s are measured over shorter durations than chronic EC_{50} and LC_{50} durations. The acute aquatic toxicity test durations are species specific and are presented in Exhibit C-10.

EXHIBIT C-10
Acute Aquatic Toxicity
Test Durations

Species	Duration
Fish	3 hours to 14 days
Daphnids (water flea)	1 to 2 days
Green algae	< 1 hour
Chironomids (e.g., midge, mayfly, stonefly)	1 to 14 days
Oysters/mussels	4 days
Mysids/shrimp	2 to 4 days
Scud (gamarus)	4 days
Aquatic plants (e.g., Duckweed)	4 days
Oligochaetes	all tests are acute (partial life cycle tests)

Source: U.S. EPA, 1997

Measured aquatic EC_{50}s and LC_{50}s were extracted from the following sources, listed in order of preference:

- Database compiled for OPPT's screening of the SARA Section 313 initial list and the hazard evaluations published for the TRI expansion list;
- ORD's AQUIRE database; and
- OPPT's environmental toxicity profiles for existing chemicals.

Predicted Chronic Value Based on Structure-Activity Relationships

"Chronic values," which were described in the section on *Measured Chronic Value/Estimated Chronic Values based on an Acute-to-Chronic Ratio*, can also be estimated based on structure-activity relationships (SARs). An SAR is a relationship between a chemical structure and a specific biological effect (Nabholz, 1991). OPPT has developed SARs to estimate the toxicity of chemicals in the absence of test data. Predicted chronic values were developed for chemicals that had no other measured data. The predicted chronic values were extracted from OPPT's environmental toxicity profiles for existing chemicals or generated with OPPT's ECOSAR program (a computer program for estimating the ecotoxicity of industrial chemicals based on SARs). Predicted chronic values provided in the environmental toxicity profiles were selected over the ECOSAR program predictions.

Although the SARs used for the OPPT environmental toxicity profiles, and contained in ECOSAR, usually predict a quantitative concentration of an aquatic toxicity endpoint, for some chemicals, they provide only a qualitative statement. In these cases, SARs predicts "no toxic effects at saturation (NTS)," which means that the chemical is not expected to cause acute and chronic aquatic toxicity up to and including the chemical's saturation point in water. Chemicals for which chronic NTS are predicted are scored low for aquatic toxicity.

Predicted Acute Value

As described in the preceding section, SARs have been developed by OPPT to estimate the aquatic toxicity of chemicals. In addition to chronic values, SARs are available that can be used to estimate acute EC_{50}s and LC_{50}s. The predicted acute EC_{50}s and LC_{50}s were extracted from OPPT's environmental toxicity profiles for existing chemicals or generated with OPPT's ECOSAR program. Predicted acute values compiled in OPPT's environmental toxicity profiles were selected over the ECOSAR program predictions.

C.2.2 Ecological Toxicity Factor Scoring Approach and Fencelines

The Aquatic Toxicity subfactor for a chemical is scored by comparing the numerical value for the highest quality data element available for that chemical against the fencelines for that data element. If the data element value meets the "high concern" fenceline for that data element, then the Aquatic Toxicity subfactor is assigned a score of 3 (high concern). If the data element value meets the specified "low concern" fenceline, then the Aquatic Toxicity subfactor is assigned a score of 1 (low concern). If the data element is between the two fencelines, then the Aquatic Toxicity subfactor is assigned a score of 2 (medium concern). Exhibit C-11 presents the fencelines for the Aquatic Toxicity subfactor data elements. The Aquatic Toxicity subfactor score (1, 2, or 3) becomes the Ecological Toxicity factor score.

The remainder of this section discusses how the fencelines for the Aquatic Toxicity subfactor data element were derived. WMPT is currently designed such that the fencelines for the Aquatic Toxicity subfactor can be categorized into three sets: (1) chronic, (2) acute, and (3) aquatic toxicity RQ. The fencelines used to score the chronic aquatic toxicity data elements (i.e., FCVs, SCVs, measured chronic values, and estimated chronic values) are identical and are discussed here as one set of fenceline values. The fencelines used to score the acute toxicity data elements (i.e., FAVs, CMCs, measured LC_{50}s and EC_{50}s, and predicted LC_{50}s and EC_{50}s) are identical, with the exception of the aquatic toxicity RQ. Although the aquatic toxicity RQ is considered to be an acute toxicity data element, its fencelines are different from the fencelines used to score the other acute toxicity data elements; thus, the aquatic toxicity RQ fencelines are discussed separately.

Chronic Aquatic Toxicity Fencelines

The WMPT fencelines used to score the chronic aquatic toxicity data elements (i.e., FCVs, SCVs, measured chronic values, and estimated chronic values) are the same fencelines that were used to score chronic AWQC in U.S. EPA OPPT's UCSS. The WMPT chronic aquatic toxicity data element fencelines are also nearly identical to the environmental toxicity classification criteria that OPPT uses to evaluate industrial chemicals under the Toxic Substances Control Act (TSCA) (U.S. EPA, 1992). The WMPT chronic aquatic toxicity data element fenceline *values* (i.e., the actual numbers with which the actual data element values are compared) are the same as those used in OPPT's TSCA chronic aquatic toxicity classification criteria; however, the fenceline *operators* differ slightly (e.g., WMPT's "high" chronic fenceline is < 0.1 mg/L while OPPT's "high" chronic fenceline is ≤ 0.1 mg/L).

EXHIBIT C-11
Aquatic Toxicity Subfactor Fencelines

Data Element	Data Quality	Scoring Fencelines		
		High (3)	Medium (2)	Low (1)
Sediment Quality FCV Tier I	Highest	< 0.1 mg/L	0.1 - 10 mg/L	> 10 mg/L
GLWQI FCV Tier I	Highest	< 0.1 mg/L	0.1 - 10 mg/L	> 10 mg/L
National AWQC FCV	Highest	< 0.1 mg/L	0.1 - 10 mg/L	> 10 mg/L
SCV Derived Based on GLWQI Tier II Methodology	High	< 0.1 mg/L	0.1 - 10 mg/L	> 10 mg/L
Measured Chronic Toxicity Value/Predicted Chronic Value Based on an Acute-to-Chronic Ratio	High	< 0.1 mg/L	0.1 - 10 mg/L	> 10 mg/L
GLWQI FAV Tier I	Medium	< 1 mg/L	1 - 100 mg/L	> 100 mg/L
National AWQC CMC	Medium	< 1 mg/L	1 - 100 mg/L	> 100 mg/L
Aquatic Toxicity RQ	Low	1, 10 pounds	100, 1000 pounds	5000 pounds
Measured Acute Value (LC_{50} or EC_{50})	Low	< 1 mg/L	1 - 100 mg/L	> 100 mg/L
Predicted Chronic Value Based on SARs	Low	< 0.1 mg/L	0.1 - 10 mg/L	> 10 mg/L
SAR Prediction of or measured No Toxic Effects at Saturation (NTS)	Low	Not applicable	Not applicable	1
Predicted Acute Value (LC_{50} or EC_{50})	Lowest	< 1 mg/L	1 - 100 mg/L	> 100 mg/L

Acute Aquatic Toxicity Fencelines

The fencelines used to score the acute aquatic toxicity data elements (i.e., FAVs, CMCs, measured LC_{50}s and EC_{50}s, and predicted LC_{50}s and EC_{50}s) are the same as those that were used to score the acute AWQC in U.S. EPA OPPT's UCSS (U.S. EPA, 1994). The WMPT acute toxicity data element fencelines are also very similar to the OPPT's environmental toxicity classification criteria for industrial chemicals (U.S. EPA, 1992). As is the case for the chronic toxicity data element fencelines, the acute toxicity data element fencelines have the same fenceline values as those used in OPPT's TSCA acute aquatic toxicity classification criteria, but the fenceline operators differ slightly.

The acute aquatic toxicity fenceline values were derived from the chronic aquatic toxicity fenceline values by assuming that the acute-to-chronic ratio for many chemicals is likely to be close to 10, the acute-to-chronic ratio for the neutral organic chemicals—the largest chemical class (U.S. EPA, 1997). Thus, the acute aquatic toxicity fenceline values are 10 times greater than the chronic aquatic toxicity fenceline values.

In effect, the application of the acute aquatic toxicity fencelines estimates chronic values, and evaluates these estimated chronic values using the same fencelines as those used to evaluate the other chronic value data elements; however, the "conversion" occurs at the fenceline level. Rather than converting all of the available acute values to estimated chronic values and presenting the predicted chronic values in the WMPT database (as is the case for those chronic values estimated based on chemical class- and species-specific acute-to-chronic ratios), U.S. EPA chose to use the acute aquatic toxicity fenceline approach to maintain transparency and to make the important distinction between those chronic values that were estimated based on chemical class- and/or species-specific acute-to-chronic ratios from those chronic values that are not estimated based on chemical class- and species-specific acute-to-chronic ratios (i.e., chronic values estimated by assuming an acute-to-chronic ratio of 10).

Aquatic Toxicity RQ Fencelines

The aquatic toxicity RQ fencelines are different from the other acute toxicity data elements because aquatic toxicity RQs are reported in pounds rather than mg/L. The aquatic toxicity RQ fencelines values were derived to be consistent with the other acute aquatic toxicity fencelines. According to U.S. EPA (1985), the aquatic toxicity thresholds that OERR uses to determine the aquatic toxicity RQ are as follows:

OERR's Aquatic Toxicity Thresholds	Aquatic toxicity RQ (pounds)
$LC_{50} < 0.1$ mg/1	1
0.1 mg/L $\leq LC_{50} <$ 1 mg/L	10
1 mg/L $\leq LC_{50} <$ 10 mg/L	100
10 mg/L $\leq LC_{50} <$ 100 mg/L	1000
100 mg/L $\leq LC_{50} <$ 500 mg/L	5000

Based on these OERR thresholds, the aquatic toxicity RQ values that correspond to the WMPT "high" acute fenceline are 1 and 10 pounds. Similarly, the aquatic toxicity RQ values that meet WMPT's "medium" acute fenceline are 100 and 1,000 pounds. The aquatic toxicity RQ value of 5,000 corresponds to WMPT's "low" acute fenceline value.

C.2.3 Ecological Toxicity Factor Limitations

This section discusses limitations associated with the Ecological Toxicity factor and Aquatic Toxicity subfactor scoring approach, data elements, data sources, and fencelines.

Ecological Toxicity Factor

A limitation associated with the Ecological Toxicity factor is that it evaluates only aquatic toxicity and does not address toxicity to terrestrial wildlife. This is important because terrestrial wildlife (e.g., predatory birds and mammals) can be particularly susceptible to the effects of persistent, bioaccumulative, and toxic (PBT) chemicals because of these organisms' high potential for exposure.

Aquatic Toxic Subfactor

Limitations associated with specific data elements and sources of data used to score the Aquatic Toxicity subfactor are discussed in the descriptions of each data element in section C.2.1. Overall limitations associated with the Aquatic Toxicity subfactor scoring approach, data elements, and fencelines include the following:

- The methodology used by U.S. EPA to derive FCVs, SCVs, FAVs, and AWQCs only addresses toxic effects in fish and aquatic invertebrates. Toxicity to algae and other aquatic plant life is not addressed.

- The Aquatic Toxicity subfactor currently uses predicted data where measured data are not available. The SARs used to predict some of the chronic values and acute values are developed from toxicity data for analogous chemicals.

- The amount of measured data used to derive OPPT's aquatic toxicity SARs varies considerably across the different SAR chemical classes. Some SARs are derived based on more data than other SARs. WMPT does not evaluate or differentiate between SAR predictions used for scoring. A score for one chemical based on an SAR based on four chemicals may be less certain than that for another chemical based on an SAR based on 50 chemicals.

C.2.4 Ecological Toxicity References

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APPENDIX D
DRAFT PRIORITIZED CHEMICAL LIST

This appendix is divided into four main sections. Section D.1 provides the background and the purpose of the Prioritized Chemical List. Section D.2 discusses the approach used to generate the list and its limitations. Section D.3 concludes by providing the list and a summary of its key data elements. Note that detailed discussion of potential applications of the Draft Prioritized Chemical List is provided in Chapter 3 of this document.

D.1 BACKGROUND AND PURPOSE OF THE DRAFT PRIORITIZED CHEMICAL LIST

The Draft Prioritized Chemical List (PCL) is a relative ranking of 879 chemicals based on the chemicals' tendency to persist in the environment once released, their tendency to accumulate in animal tissues (i.e., bioaccumulate), and their toxicity (i.e., their potential to cause adverse effects in humans or aquatic ecosystems). Persistence, bioaccumulation potential, and toxicity (often referred to in this document as PBT criteria or properties) are key predictors of chronic (i.e., long-term) risk.

The PCL is one of several outputs of the Waste Minimization Prioritization Tool. It is intended to assist government agencies and the public in implementing the Waste Minimization National Plan, which calls for a reduction in the most persistent, bioaccumulative, and toxic chemicals in the nation's hazardous wastes by 50 percent by the year 2005. Progress toward the goal will also be measured under the Government Performance and Results Act. U.S. EPA plans to use the PCL as a starting point in identifying a shorter list of chemicals (the National Waste Minimization Measurement List) that can be used to track progress toward the goal.

D.2 APPROACH USED TO GENERATE THE DRAFT PRIORITIZED CHEMICAL LIST

Chemical priorities were identified by assigning scores to each chemical that represent the potential risk posed to human health and to aquatic ecosystems. The human health risk potential score was calculated for each chemical by adding separate persistence, bioaccumulation, and human chronic toxicity scores. Similarly, the ecological risk potential score was calculated by adding separate persistence, bioaccumulation, and ecological toxicity scores. The **overall score** for each chemical represents the sum of the persistence, bioaccumulation, and toxicity scores for human health risk potential added to the corresponding scores for ecological risk potential; the rankings or priorities among the chemicals are based on the overall score for the chemicals. U.S. EPA made extensive efforts to collect and incorporate the best available data for these PBT properties in developing the list. Chemicals missing data on any of these properties were not scored.

The overall score for a given chemical can be used for comparison with other chemicals to develop a sense of the relative concern for that chemical, in terms of its potential risk to human health and aquatic ecosystems. Although the persistence, bioaccumulation, and toxicity properties are predictors of potential chronic (long-term) risk, these chemical properties are merely a starting point in assessing actual risk associated with a particular management practice or site. Other factors that influence risk include chemical quantities, waste management practices, fate and transport in the environment, actual exposure dose, and size of potentially-exposed populations.

Note that the overall scores of chemicals on the PCL do *not* incorporate chemical quantity (or mass). Chemical quantity, however, is another important predictor of risk that can be used in conjunction with PBT scores to rank chemicals.

D.3 THE DRAFT PRIORITIZED CHEMICAL LIST

Exhibit D-1 presents the PCL. It includes nine data elements:

(1) CAS number;
(2) Chemical name;
(3) Persistence score for human health risk potential;
(4) Bioaccumulation score for human health risk potential;
(5) Human toxicity score for human health risk potential;
(6) Persistence score for ecological risk potential;
(7) Bioaccumulation score for ecological risk potential;
(8) Ecological toxicity score for ecological risk potential; and
(9) Overall chemical score.

The chemicals in Exhibit D-1 are ranked by their overall chemical score. Due to the nature of the scoring process, several chemicals can have the same overall score. The chemicals on the list, therefore, are presented first in descending numerical order by their overall scores, and then in alphabetical order within a particular overall score.

A chemical on the PCL can have a minimum score of six to a maximum score of 18. These overall scores are derived by adding the individual persistence, bioaccumulation, and toxicity scores, each of which range from 1 (low) to 3 (high). Chemicals with a high overall score are generally of greater concern from a chronic risk perspective (i.e., are more persistent, bioaccumulative, and toxic) than those with a low overall score. For example, chlordene, which has an overall score of 17, may potentially pose a greater risk to human health and the environment based on the PBT criteria than 1,1,1-trichloroethane, which has an overall score of 11. Larger differences in chemical scores (e.g., 17 vs. 11) are more significant than smaller differences (e.g., 16 vs. 15). Chemicals with relatively low scores on the list should not be interpreted as "risk-free," since all chemicals may be harmful under certain conditions.

See Appendices A to C for a detailed discussion of underlying data and scoring for human and ecological exposure and toxicity.

EXHIBIT D-1
Draft Prioritized Chemical List

CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	3	3	3	3	3	3	18
56-49-5	3-Methylcholanthrene	3	3	3	3	3	3	18
57-97-6	7,12-Dimethylbenz(a)anthracene	3	3	3	3	3	3	18
309-00-2	Aldrin	3	3	3	3	3	3	18
56-55-3	Benzo(a)anthracene	3	3	3	3	3	3	18
50-32-8	Benzo(a)pyrene	3	3	3	3	3	3	18
205-99-2	Benzo(b)fluoranthene	3	3	3	3	3	3	18
189-55-9	Benzo(rst)pentaphene	3	3	3	3	3	3	18
57-74-9	Chlordane	3	3	3	3	3	3	18
72-54-8	DDD, p,p'-	3	3	3	3	3	3	18
72-55-9	DDE, p,p'-	3	3	3	3	3	3	18
50-29-3	DDT, p,p'-	3	3	3	3	3	3	18
53-70-3	Dibenzo(a,h)anthracene	3	3	3	3	3	3	18
60-57-1	Dieldrin	3	3	3	3	3	3	18
72-20-8	Endrin	3	3	3	3	3	3	18
76-44-8	Heptachlor	3	3	3	3	3	3	18
118-74-1	Hexachlorobenzene	3	3	3	3	3	3	18
77-47-4	Hexachlorocyclopentadiene	3	3	3	3	3	3	18
70-30-4	Hexachlorophene	3	3	3	3	3	3	18
143-50-0	Kepone	3	3	3	3	3	3	18
7439-97-6	Mercury	3	3	3	3	3	3	18
2385-85-5	Mirex	3	3	3	3	3	3	18
608-93-5	Pentachlorobenzene	3	3	3	3	3	3	18
1336-36-3	Polychlorinated biphenyls	3	3	3	3	3	3	18
8001-35-2	Toxaphene	3	3	3	3	3	3	18
194-59-2	7H-Dibenzo(c,g)carbazole	3	3	2	3	3	3	17
191-24-2	Benzo(g,h,i)perylene	3	3	2	3	3	3	17
205-82-3	Benzo(j)fluoranthene	3	3	2	3	3	3	17
207-08-9	Benzo(k)fluoranthene	3	3	2	3	3	3	17
2104-96-3	Bromophos	3	3	2	3	3	3	17
3734-48-3	Chlordene	3	3	2	3	3	3	17
7440-48-4	Cobalt	3	3	2	3	3	3	17
226-36-8	Dibenz(a,h)acridine	3	3	2	3	3	3	17
224-42-0	Dibenz(a,j)acridine	3	3	2	3	3	3	17
192-65-4	Dibenzo(a,e)pyrene	3	3	2	3	3	3	17

EXHIBIT D-1
Draft Prioritized Chemical List

CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
189-64-0	Dibenzo(a,h)pyrene	3	3	2	3	3	3	17
115-32-2	Dicofol	3	3	2	3	3	3	17
206-44-0	Fluoranthene	3	3	2	3	3	3	17
193-39-5	Indeno(1,2,3-cd)pyrene	3	3	2	3	3	3	17
297-78-9	Isobenzan	3	3	2	3	3	3	17
465-73-6	Isodrin	3	3	2	3	3	3	17
21609-90-5	Leptophos	3	3	2	3	3	3	17
72-43-5	Methoxychlor	3	3	2	3	3	3	17
40487-42-1	Pendimethalin	3	3	2	3	3	3	17
87-86-5	Pentachlorophenol	3	3	2	3	3	3	17
79-94-7	Tetrabromobisphenol A	3	3	2	3	3	3	17
327-98-0	Trichloronate	3	3	2	3	3	3	17
1582-09-8	Trifluralin	3	3	2	3	3	3	17
7440-62-2	Vanadium	3	3	2	3	3	3	17
95-94-3	1,2,4,5-Tetrachlorobenzene	3	2	3	3	2	3	16
1836-75-5	2,4-Dichloro-1-(4-nitrophenoxy)benzene	3	2	3	3	2	3	16
91-94-1	3,3'-Dichlorobenzidine	3	2	3	3	2	3	16
101-14-4	4,4'-Methylenebis(2-chloroaniline)	3	2	3	3	2	3	16
101-68-8	4,4'-Methylenediphenyl isocyanate	2	3	3	2	3	3	16
12674-11-2	Arochlor 1016	2	3	3	2	3	3	16
1861-40-1	Benefin	3	3	1	3	3	3	16
510-15-6	Chlorobenzilate	3	2	3	3	2	3	16
21923-23-9	Chlorthiophos	2	3	3	2	3	3	16
218-01-9	Chrysene	3	3	2	3	3	2	16
56-53-1	Diethylstilbestrol	2	3	3	2	3	3	16
115-29-7	Endosulfan	3	2	3	3	2	3	16
563-12-2	Ethion	2	3	3	2	3	3	16
1024-57-3	Heptachlor epoxide	3	2	3	3	2	3	16
87-82-1	Hexabromobenzene	3	3	2	3	3	2	16
87-68-3	Hexachlorobutadiene	3	2	3	3	2	3	16
608-73-1	Hexachlorocyclohexane	3	2	3	3	2	3	16
319-84-6	Hexachlorocyclohexane, alpha-	3	2	3	3	2	3	16
58-89-9	Hexachlorocyclohexane, gamma-	3	2	3	3	2	3	16
26399-36-0	Profluralin	3	3	2	3	3	2	16
3118-97-6	1-((2,4-Dimethylphenyl)azo)-2-naphthalenol	2	3	2	2	3	3	15

EXHIBIT D-1
Draft Prioritized Chemical List

CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
4901-51-3	2,3,4,5-Tetrachlorophenol	3	2	2	3	2	3	15
58-90-2	2,3,4,6-Tetrachlorophenol	3	2	2	3	2	3	15
786-19-6	Carbophenothion	2	3	2	2	3	3	15
55285-14-8	Carbosulfan	2	3	2	2	3	3	15
470-90-6	Chlorfenvinfos	3	2	2	3	2	3	15
2921-88-2	Chlorpyrifos	3	2	2	3	2	3	15
5598-13-0	Chlorpyrifos methyl	3	2	2	3	2	3	15
1861-32-1	Dacthal	3	2	2	3	2	3	15
67-72-1	Hexachloroethane	3	2	2	3	2	3	15
33820-53-0	Isopropalin	3	3	2	3	3	1	15
2234-13-1	Octachloronaphthalene	3	3	2	3	3	1	15
112-90-3	Oleyl amine	2	3	2	2	3	3	15
82-68-8	Pentachloronitrobenzene	3	2	2	3	2	3	15
25154-52-3	Phenol, nonyl-	2	3	2	2	3	3	15
4104-14-7	Phosacetim	3	2	2	3	2	3	15
3468-63-1	Pigment orange 5	3	3	2	3	3	1	15
129-00-0	Pyrene	3	2	2	3	2	3	15
3383-96-8	Temephos	2	3	2	2	3	3	15
961-11-5	Tetrachlorvinphos	3	2	2	3	2	3	15
2303-17-5	Triallate	3	2	2	3	2	3	15
1330-78-5	Tricresyl phosphate	2	3	2	2	3	3	15
126-72-7	Tris(2,3-dibromopropyl)phosphate	3	2	3	3	2	2	15
3380-34-5	2,4,4'-Trichloro-2'-hydroxidiphenyl ether	3	2	1	3	2	3	14
118-79-6	2,4,6-Tribromophenol	2	2	3	2	2	3	14
140-66-9	4-(1,1,3,3-Tetramethylbutyl)phenol	2	3	1	2	3	3	14
84852-15-3	4-Nonyl phenol, branched	2	3	1	2	3	3	14
14351-50-9	9-Octadecenylamine, N,N-dimethyl-, N-oxide, (Z)-	2	3	1	2	3	3	14
7440-36-0	Antimony	3	1	3	3	1	3	14
7440-39-3	Barium	3	1	3	3	1	3	14
225-51-4	Benz(c)acridine	3	2	2	3	2	2	14
7440-41-7	Beryllium	3	1	3	3	1	3	14
7440-43-9	Cadmium	3	1	3	3	1	3	14
494-03-1	Chlornaphazin	2	2	3	2	2	3	14
1937-37-7	CI Direct Black 38	3	2	3	3	2	1	14
78-48-8	DEF	1	3	3	1	3	3	14

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
333-41-5	Diazinon	2	2	3	2	2	3	14
26761-40-0	Diisodecyl phthalate	2	3	1	2	3	3	14
28553-12-0	Diisononyl phthalate	2	3	1	2	3	3	14
298-04-4	Disulfoton	2	2	3	2	2	3	14
319-85-7	Hexachlorocyclohexane, beta-	3	2	2	3	2	2	14
319-86-8	Hexachlorocyclohexane, delta-	3	2	2	3	2	2	14
135-88-6	N-phenyl-2-naphthalenamine	2	2	3	2	2	3	14
7440-02-0	Nickel	3	1	3	3	1	3	14
556-67-2	Octamethyl cyclotetrasiloxane	2	3	1	2	3	3	14
9036-19-5	Octylphenoxy polyethoxyethanol	2	3	1	2	3	3	14
98-51-1	p-tert-Butyltoluene	2	3	2	2	3	2	14
434-64-0	Perfluorotoluene	3	2	2	3	2	2	14
298-02-2	Phorate	2	2	3	2	2	3	14
50-55-5	Reserpine	3	2	3	3	2	1	14
57-24-9	Strychnine	3	1	3	3	1	3	14
3689-24-5	Sulfotepp	2	2	3	2	2	3	14
13071-79-9	Terbufos	2	2	3	2	2	3	14
7440-28-0	Thallium	3	1	3	3	1	3	14
78-30-8	Tri-o-cresyl phosphate	2	3	2	2	3	2	14
101-02-0	Triphenyl phosphite	2	3	1	2	3	3	14
101-84-8	1,1'-Oxybisbenzene	2	2	2	2	2	3	13
108-70-3	1,3,5-Trichlorobenzene	2	2	2	2	2	3	13
4904-61-4	1,5,9-Cyclododecatriene	2	3	1	2	3	2	13
5989-27-5	1-Methyl-4-(1-methylethenyl)cyclohexene, (R)	2	2	2	2	2	3	13
94-81-5	2-Methyl-4-chlorophenoxybutyric acid (MCPB)	2	2	2	2	2	3	13
91-57-6	2-Methylnaphthalene	2	2	2	2	2	3	13
101-55-3	4-Bromophenyl phenyl ether	2	2	2	2	2	3	13
98-56-6	4-Chlorobenzotrifluoride	2	2	2	2	2	3	13
7005-72-3	4-Chlorophenyl phenyl ether	2	2	2	2	2	3	13
83-32-9	Acenaphthene	2	2	2	2	2	3	13
140-57-8	Aramite	2	2	2	2	2	3	13
7440-38-2	Arsenic	3	1	3	3	1	2	13
548-62-9	Basic violet 3	3	1	2	3	1	3	13
95-93-2	Benzene, 1,2,4,5-tetramethyl	2	2	2	2	2	3	13
98-07-7	Benzotrichloride	2	2	3	2	2	2	13

EXHIBIT D-1
Draft Prioritized Chemical List

CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
117-81-7	Bis(2-ethyhexyl)phthalate	1	3	2	1	3	3	13
4044-65-9	Bitoscanate	2	2	2	2	2	3	13
1689-99-2	Bromoxynil octanoate	1	3	2	1	3	3	13
357-57-3	Brucine	3	1	3	3	1	2	13
2008-41-5	Butylate	2	2	2	2	2	3	13
2425-06-1	Captafol	3	1	2	3	1	3	13
56-23-5	Carbon tetrachloride	3	1	3	3	1	2	13
305-03-3	Chlorambucil	2	2	3	2	2	2	13
118-75-2	Chloranil	3	1	2	3	1	3	13
1982-47-4	Chloroxuron	2	2	2	2	2	3	13
7440-47-3	Chromium	3	1	2	3	1	3	13
7440-50-8	Copper	3	1	2	3	1	3	13
56-72-4	Coumaphos	2	2	2	2	2	3	13
21725-46-2	Cyanazine	3	1	2	3	1	3	13
294-62-2	Cyclododecane	2	3	1	2	3	2	13
10311-84-9	Dialifor	2	2	2	2	2	3	13
77-73-6	Dicyclopentadiene	2	2	3	2	2	2	13
20830-75-5	Digoxin	3	1	3	3	1	2	13
94-58-6	Dihydrosafrole	2	2	3	2	2	2	13
28804-88-8	Dimethylnaphthalene	2	2	2	2	2	3	13
882-33-7	Diphenyl sulfide	2	2	2	2	2	3	13
112-55-0	Dodecyl mercaptan, n-	1	3	2	1	3	3	13
86-73-7	Fluorene	2	2	2	2	2	3	13
944-22-9	Fonofos	2	2	2	2	2	3	13
303-34-4	Lasiocarpine	3	1	3	3	1	2	13
7439-92-1	Lead	3	1	2	3	1	3	13
150-50-5	Merphos	1	3	3	1	3	2	13
60-11-7	N,N-Dimethyl-4-(phenylazo)benzenamine	2	2	3	2	2	2	13
133-07-3	N-(Trichloromethylthio)phthalimide	3	1	2	3	1	3	13
9016-45-9	Nonylphenol, ethoxylated	2	3	1	2	3	2	13
56-38-2	Parathion	2	2	2	2	2	3	13
76-01-7	Pentachloroethane	3	1	2	3	1	3	13
139-40-2	Propazine	3	1	2	3	1	3	13
299-84-3	Ronnel	2	2	2	2	2	3	13
7782-49-2	Selenium	3	1	2	3	1	3	13

EXHIBIT D-1
Draft Prioritized Chemical List

CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
7440-22-4	Silver	3	1	2	3	1	3	13
131-52-2	Sodium pentachlorophenate	3	1	2	3	1	3	13
97-77-8	Tetraethylthiuram disulfide	2	2	2	2	2	3	13
26471-62-5	Toluene diisocyanate, commercial	2	2	3	2	2	2	13
91-08-7	Toluene-2,6-diisocyanate	2	2	2	2	2	3	13
25167-82-2	Trichlorophenol	2	2	2	2	2	3	13
1929-77-7	Vernam	2	2	2	2	2	3	13
7440-66-6	Zinc	3	1	2	3	1	3	13
630-20-6	1,1,1,2-Tetrachloroethane	3	1	2	3	1	2	12
96-18-4	1,2,3-Trichloropropane	2	1	3	2	1	3	12
120-82-1	1,2,4-Trichlorobenzene	2	2	2	2	2	2	12
528-29-0	1,2-Dinitrobenzene	2	1	3	2	1	3	12
122-66-7	1,2-Diphenylhydrazine	2	1	3	2	1	3	12
1918-02-1	1,2-Pyridinecarboxylic acid, 4-amino-3,5,6-trichloro	3	1	2	3	1	2	12
99-35-4	1,3,5-Trinitrobenzene	2	1	3	2	1	3	12
541-73-1	1,3-Dichlorobenzene	2	2	1	2	2	3	12
100-25-4	1,4-Dinitrobenzene	2	1	3	2	1	3	12
4080-31-3	1-(3-Chloroallyl)-3,5,7-triaza-1-azoniaadam-antane chloride	3	1	2	3	1	2	12
872-05-9	1-Decene	1	3	1	1	3	3	12
112-41-4	1-Dodecene	1	3	1	1	3	3	12
107-64-2	1-Octadecanaminium, N,N-dimethyl-N-octadecyl-, chloride	1	3	1	1	3	3	12
112-88-9	1-Octadecene	2	3	1	2	3	1	12
57-06-7	1-Propene, 3-isothiocyanato-	2	1	3	2	1	3	12
1120-36-1	1-Tetradecene	1	3	1	1	3	3	12
2437-56-1	1-Tridecene	1	3	1	1	3	3	12
821-95-4	1-Undecene	1	3	1	1	3	3	12
93-72-1	2,4,5-TP (Silvex)	2	2	2	2	2	2	12
95-95-4	2,4,5-Trichlorophenol	2	2	2	2	2	2	12
634-93-5	2,4,6-Trichloroaniline	2	2	2	2	2	2	12
121-14-2	2,4-Dinitrotoluene	2	1	3	2	1	3	12
25013-16-5	2- and 3-t-Butyl-4-hydroxyanisole	2	2	2	2	2	2	12
91-58-7	2-Chloronaphthalene	2	2	2	2	2	2	12
131-89-5	2-Cyclohexyl-4,6-dinitrophenol	2	2	2	2	2	2	12
75-86-5	2-Hydroxy-2-methyl propanenitrile	2	1	3	2	1	3	12
94-74-6	2-Methyl-4-chlorophenoxyacetic acid (MCPA)	2	1	3	2	1	3	12

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
119-90-4	3,3'-Dimethoxybenzidine	2	1	3	2	1	3	12
482-89-3	3H-Indol-3-one, 2-(1,3-dihydro-3-oxo-2H-indol-2-ylidene)-1,2-dihydro-	2	2	2	2	2	2	12
94-82-6	4-(2,4-Dichlorophenoxy) butyric acid	2	2	2	2	2	2	12
504-24-5	4-Aminopyridine	2	1	3	2	1	3	12
120-12-7	Anthracene	2	2	1	2	2	3	12
836-30-6	Benzenamine, 4-nitro-N-phenyl-	2	2	2	2	2	2	12
71-43-2	Benzene	2	1	3	2	1	3	12
120-78-5	Bis-benzothiazole-2,2'-disulfide	2	2	2	2	2	2	12
133-06-2	Captan	3	1	2	3	1	2	12
1563-66-2	Carbofuran	2	1	3	2	1	3	12
81-88-9	CI Food Red 15	3	1	2	3	1	2	12
64-86-8	Colchicine	3	1	3	3	1	1	12
20830-81-3	Daunomycin	3	1	3	3	1	1	12
124-18-5	Decane	1	3	1	1	3	3	12
8065-48-3	Demeton	2	1	3	2	1	3	12
2303-16-4	Diallate	2	2	2	2	2	2	12
109-43-3	Dibutyl sebacate	1	3	1	1	3	3	12
141-66-2	Dicrotophos	2	1	3	2	1	3	12
1464-53-5	Diepoxybutane	2	1	3	2	1	3	12
60-51-5	Dimethoate	2	1	3	2	1	3	12
88-85-7	Dinoseb	2	2	2	2	2	2	12
122-39-4	Diphenylamine	2	2	2	2	2	2	12
111-82-0	Dodecanoic acid, methyl ester	1	3	1	1	3	3	12
13194-48-4	Ethoprophos	2	2	1	2	2	3	12
22224-92-6	Fenamiphos	2	1	3	2	1	3	12
59756-60-4	Fluridone	3	1	2	3	1	2	12
67-45-8	Furazolidone	2	1	3	2	1	3	12
86-50-0	Guthion	2	1	3	2	1	3	12
392-56-3	Hexafluorobenzene	3	1	2	3	1	2	12
103-23-1	Hexanedioic acid, bis(2-ethylhexyl)ester	1	3	1	1	3	3	12
110-27-0	Isopropyl myristate	1	3	1	1	3	3	12
142-91-6	Isopropyl palmitate	2	3	1	2	3	1	12
109-77-3	Malononitrile	2	1	3	2	1	3	12
7487-94-7	Mercuric chloride	2	1	3	2	1	3	12

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
10265-92-6	Methamidophos	2	1	3	2	1	3	12
298-00-0	Methyl parathion	2	1	3	2	1	3	12
1321-94-4	Methylnapthlalene	2	2	2	2	2	2	12
56-04-2	Methylthiouracil	2	1	3	2	1	3	12
50-07-7	Mitomycin C	3	1	3	3	1	1	12
7439-98-7	Molybdenum	3	1	2	3	1	2	12
6923-22-4	Monocrotophos	2	1	3	2	1	3	12
98-95-3	Nitrobenzene	2	1	3	2	1	3	12
611-14-3	o-Ethyltoluene	2	2	2	2	2	2	12
111-65-9	Octane	1	3	1	1	3	3	12
622-96-8	p-Ethyltoluene	2	2	2	2	2	2	12
98-73-7	p-tert-Butylbenzoic acid	2	2	2	2	2	2	12
1910-42-5	Paraquat dichloride	2	1	3	2	1	3	12
62-38-4	Phenylmercury acetate	2	1	3	2	1	3	12
732-11-6	Phosmet	2	1	3	2	1	3	12
124-87-8	Picrotoxin	3	1	2	3	1	2	12
13515-40-7	Pigment yellow 73	3	2	1	3	2	1	12
127-91-3	Pinene, beta	2	2	1	2	2	3	12
23950-58-5	Pronamide	3	1	2	3	1	2	12
108-98-5	Thiophenol	2	1	3	2	1	3	12
584-84-9	Toluene-2,4-diisocyanate	2	2	2	2	2	2	12
12002-48-1	Trichlorobenzene	2	2	2	2	2	2	12
115-86-6	Triphenyl phosphate	1	2	3	1	2	3	12
71-55-6	1,1,1-Trichloroethane	2	1	2	2	1	3	11
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	3	1	1	3	1	2	11
75-34-3	1,1-Dichloroethane	2	1	2	2	1	3	11
96-12-8	1,2-Dibromo-3-chloropropane	2	1	3	2	1	2	11
106-93-4	1,2-Dibromoethane	2	1	3	2	1	2	11
95-50-1	1,2-Dichlorobenzene	2	1	2	2	1	3	11
107-06-2	1,2-Dichloroethane	2	1	2	2	1	3	11
96-23-1	1,3-Dichloropropanol	2	1	2	2	1	3	11
542-75-6	1,3-Dichloropropylene	2	1	3	2	1	2	11
99-65-0	1,3-Dinitrobenzene	2	1	3	2	1	2	11
130-15-4	1,4-Naphthoquinone	2	1	2	2	1	3	11
112-53-8	1-Dodecanol	1	3	1	1	3	2	11

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
99-87-6	1-Methyl-4-(1-methylethyl)benzene	2	2	1	2	2	2	11
6846-50-0	2,2,4-Trimethyl-1,3-pentanediol diisobutylate	2	2	1	2	2	2	11
2431-50-7	2,3,4-Trichloro-1-butene	2	1	2	2	1	3	11
120-83-2	2,4-Dichlorophenol	2	1	2	2	1	3	11
128-37-0	2,6-Di-tert-butyl-p-cresol	1	3	1	1	3	2	11
21564-17-0	2-(Thiocyanomethylthio)benzothiazole	2	1	2	2	1	3	11
52-51-7	2-Bromo-2-nitro-1,3-propanediol	2	1	2	2	1	3	11
532-27-4	2-Chloro-1-phenylethanone	2	1	3	2	1	2	11
149-30-4	2-Mercaptobenzothiazole	2	1	2	2	1	3	11
636-21-5	2-Methylaniline hydrochloride	2	1	2	2	1	3	11
538-93-2	2-Methylpropyl benzene	2	2	1	2	2	2	11
91-59-8	2-Naphthylamine	2	1	3	2	1	2	11
119-93-7	3,3'-Dimethylbenzidine	2	1	3	2	1	2	11
95-76-1	3,4-Dichloroaniline	2	1	2	2	1	3	11
107-05-1	3-Chloro-1-propene	2	1	3	2	1	2	11
95-74-9	3-Chloro-p-toluidine	2	1	2	2	1	3	11
108-42-9	3-Chloroaniline	2	1	2	2	1	3	11
534-52-1	4,6-Dinitro-o-cresol	2	1	3	2	1	2	11
60-09-3	4-(Phenylazo)benzenamine	2	1	2	2	1	3	11
92-67-1	4-Aminobiphenyl	2	1	3	2	1	2	11
120-32-1	4-Chloro-2-chlorophenol(phenylmethyl)phenol	1	2	2	1	2	3	11
3165-93-3	4-Chloro-2-methylaniline hydrochloride	2	1	2	2	1	3	11
15972-60-8	Alachlor	2	2	2	2	2	1	11
116-06-3	Aldicarb	2	1	2	2	1	3	11
1646-88-4	Aldicarb sulfone	2	1	2	2	1	3	11
834-12-8	Ametryn	2	1	2	2	1	3	11
61-82-5	Amitrole	2	1	3	2	1	2	11
7173-51-5	Ammonium, didecyldimethyl-, chloride	1	2	2	1	2	3	11
1912-24-9	Atrazine	2	1	2	2	1	3	11
2642-71-9	Azinphos-Ethyl	2	1	2	2	1	3	11
569-64-2	Basic green 4	2	1	2	2	1	3	11
17804-35-2	Benomyl	2	1	2	2	1	3	11
99-51-4	Benzene, 1,2-dimethyl-4-nitro	2	1	3	2	1	2	11
25376-45-8	Benzenediamine, ar-methyl-	2	1	2	2	1	3	11
27176-87-0	Benzenesulfonic acid, dodecyl-	2	2	1	2	2	2	11

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
92-87-5	Benzidine	2	1	3	2	1	2	11
577-11-7	Bis(2-ethylhexyl) sodium sulfosuccinate	1	3	1	1	3	2	11
85-68-7	Butyl benzyl phthalate	1	2	2	1	2	3	11
55406-53-6	Carbamic acid, butyl-, 3-iodo-2-propynyl ester	2	1	2	2	1	3	11
63-25-2	Carbaryl	2	1	2	2	1	3	11
107-20-0	Chloroacetaldehyde	2	1	2	2	1	3	11
67-66-3	Chloroform	2	1	3	2	1	2	11
121-73-3	Chloronitrobenzene, m-	2	1	2	2	1	3	11
4680-78-8	CI Acid Green 3	3	1	2	3	1	1	11
6876-23-9	Cyclohexane, 1,2-dimethyl, trans-	2	2	1	2	2	2	11
91-17-8	decahydronapthalene	2	2	1	2	2	2	11
117-84-0	Di-n-octyl phthalate	1	3	2	1	3	1	11
84-74-2	Dibutyl phthalate	1	2	2	1	2	3	11
311-45-5	Diethyl-p-nitrophenyl phosphate	2	1	2	2	1	3	11
148-18-5	Diethyldithiocarbamic acid, sodium salt	2	1	2	2	1	3	11
77-78-1	Dimethyl sulfate	2	1	3	2	1	2	11
644-64-4	Dimetilan	2	1	2	2	1	3	11
25321-14-6	Dinitrotoluene	2	1	3	2	1	2	11
78-34-2	Dioxathion	2	1	2	2	1	3	11
138-86-3	Dipentene	2	2	1	2	2	2	11
106-89-8	Epichlorohydrin	2	1	3	2	1	2	11
759-94-4	EPTC	2	1	2	2	1	3	11
75-21-8	Ethylene oxide	2	1	3	2	1	2	11
96-45-7	Ethylene thiourea	2	1	3	2	1	2	11
64-02-8	Ethylenediaminetetraaceteic acid, tetrasodium salt	3	1	2	3	1	1	11
122-14-5	Fenitrothion	2	1	2	2	1	3	11
51-21-8	Fluorouracil	2	1	2	2	1	3	11
23422-53-9	Formetanate hydrochloride	2	1	2	2	1	3	11
140-01-2	Glycine, N,N-bis	3	1	2	3	1	1	11
110-54-3	Hexane	1	2	2	1	2	3	11
119-38-0	Isopropylmethylpyrazolyl dimethylcarbamate	2	1	2	2	1	3	11
330-55-2	Linuron	2	1	2	2	1	3	11
121-75-5	Malathion	2	1	2	2	1	3	11
12427-38-2	Maneb	2	1	2	2	1	3	11
51-75-2	Mechlorethamine	2	1	3	2	1	2	11

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
1600-27-7	Mercuric acetate	2	1	2	2	1	3	11
950-37-8	Methidathion	2	1	2	2	1	3	11
2032-65-7	Methiocarb	2	1	2	2	1	3	11
108-87-2	Methyl cyclohexane	2	2	1	2	2	2	11
1129-41-5	Metolcarb	2	1	2	2	1	3	11
7786-34-7	Mevinphos	2	1	2	2	1	3	11
505-60-2	Mustard gas	2	1	3	2	1	2	11
105-55-5	N,N'-Diethylthiourea	2	1	3	2	1	2	11
53-96-3	N-9H-Fluoren-2-yl acetamide	2	1	3	2	1	2	11
55-18-5	N-Nitrosodiethylamine	2	1	3	2	1	2	11
103-65-1	n-Propylbenzene	1	2	2	1	2	3	11
300-76-5	Naled	2	1	2	2	1	3	11
91-20-3	Naphthalene	2	1	2	2	1	3	11
10595-95-6	Nitrosomethylethylamine	2	1	3	2	1	2	11
51811-79-1	Nonylphenol ethoxylated + phosphated	2	2	1	2	2	2	11
23135-22-0	Oxamyl	2	1	2	2	1	3	11
88-04-0	p-Chloro-m-xylenol	2	1	2	2	1	3	11
64-00-6	Phenol, 3-(1-Methylethyl)-, methyl carbamate	2	1	2	2	1	3	11
108-45-2	Phenylenediamine, m-	2	1	2	2	1	3	11
95-54-5	Phenylenediamine, o-	2	1	3	2	1	2	11
13171-21-6	Phosphamidon	2	1	2	2	1	3	11
57-47-6	Physostigmine	3	1	2	3	1	1	11
80-56-8	Pinene, alpha	2	2	1	2	2	2	11
1918-16-7	Propachlor	2	1	2	2	1	3	11
95-63-6	Pseudocumene	2	2	1	2	2	2	11
106-51-4	Quinone	2	1	2	2	1	3	11
81-07-2	Saccharin and salts	2	1	2	2	1	3	11
122-34-9	Simazine	2	1	2	2	1	3	11
2893-78-9	Sodium dichloroisocyanurate	2	1	2	2	1	3	11
62-74-8	Sodium fluoroacetate	2	1	3	2	1	2	11
107-49-3	Tetraethyl pyrophosphate	2	1	3	2	1	2	11
39196-18-4	Thiofanox	2	1	3	2	1	2	11
297-97-2	Thionazin	2	1	2	2	1	3	11
62-56-6	Thiourea	2	1	3	2	1	2	11
137-26-8	Thiram	2	1	2	2	1	3	11

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
98-13-5	Trichlorophenylsilane	2	2	2	2	2	1	11
52-68-6	Trichlorophon	2	1	2	2	1	3	11
81-81-2	Warfarin	2	1	3	2	1	2	11
92-83-1	Xanthene	2	2	1	2	2	2	11
79-34-5	1,1,2,2-Tetrachloroethane	2	1	2	2	1	2	10
79-00-5	1,1,2-Trichloroethane	2	1	2	2	1	2	10
496-72-0	1,2-Diamino-4-methylbenzene	2	1	2	2	1	2	10
35691-65-7	1,2-Dibromo-2,4-dicyanobutane	2	1	2	2	1	2	10
1120-71-4	1,2-Oxathiolane, 2,2-dioxide	2	1	3	2	1	1	10
2691-41-0	1,3,5,7-Tetrazocine, octahydro-1,3,5,7-tetranitro-	2	1	2	2	1	2	10
626-17-5	1,3-Benzenedicarbonitrile	2	1	2	2	1	2	10
10061-01-5	1,3-Dichloropropene, cis-	2	1	2	2	1	2	10
10061-02-6	1,3-Dichloropropene, trans-	2	1	2	2	1	2	10
110-57-6	1,4-Dichloro-trans-2-butene	2	1	2	2	1	2	10
106-46-7	1,4-Dichlorobenzene	2	1	1	2	1	3	10
2243-62-1	1,5'-Naphthalenediamine	2	1	2	2	1	2	10
591-08-2	1-Acetyl-2-thiourea	2	1	3	2	1	1	10
106-43-4	1-Chloro-4-methylbenzene	2	1	2	2	1	2	10
100-00-5	1-Chloro-4-nitrobenzene	2	1	2	2	1	2	10
90-12-0	1-Methylnaphthalene	1	2	2	1	2	2	10
134-32-7	1-Naphthalenamine	2	1	2	2	1	2	10
111-66-0	1-Octene	1	2	1	1	2	3	10
271-89-6	2,3-Benzofuran	2	1	2	2	1	2	10
496-11-7	2,3-Dihydro-1H-indene	2	1	2	2	1	2	10
93-76-5	2,4,5-Trichlorophenoxyacetic acid	2	1	2	2	1	2	10
88-06-2	2,4,6-Trichlorophenol	1	2	2	1	2	2	10
118-96-7	2,4,6-Trinitrotoluene (TNT)	1	1	3	1	1	3	10
94-75-7	2,4-D	2	1	2	2	1	2	10
51-28-5	2,4-Dinitrophenol	2	1	2	2	1	2	10
123-54-6	2,4-Pentanedione	2	1	2	2	1	2	10
95-68-1	2,4-Xylidine	2	1	2	2	1	2	10
95-82-9	2,5-Dichlorobenzenamine	2	1	2	2	1	2	10
87-62-7	2,6-Dimethylbenzenamine	2	1	2	2	1	2	10
606-20-2	2,6-Dinitrotoluene	2	1	2	2	1	2	10
99-55-8	2-Methyl-5-nitroaniline	2	1	2	2	1	2	10

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
26530-20-1	2-n-Octyl-4-isothiazolin-3-one	1	1	3	1	1	3	10
88-75-5	2-Nitrophenol	2	1	2	2	1	2	10
103-11-7	2-Propenoic acid, 2-ethylhexyl ester	1	2	2	1	2	2	10
760-23-6	3,4-Dichloro-1-butene	2	1	2	2	1	2	10
98-16-8	3-(Trifluoromethyl)benzenamine	2	1	2	2	1	2	10
133-90-4	3-Amino-2,5-dichlorobenzoic acid	2	1	2	2	1	2	10
98-92-0	3-Pyridinecarboxamide	2	1	1	2	1	3	10
106-47-8	4-Chloroaniline	2	1	2	2	1	2	10
95-80-7	4-Methyl-1,3-benzenediamine	2	1	3	2	1	1	10
59-89-2	4-Nitrosomorpholine	2	1	3	2	1	1	10
110-93-0	5-Hepten-2-one, 6-methyl	2	1	2	2	1	2	10
2702-72-9	Acetic acid, (2,4-dichlorophenoxy)-, sodium salt	2	1	2	2	1	2	10
107-02-8	Acrolein	1	1	3	1	1	3	10
591-27-5	Aminophenol, m-	2	1	2	2	1	2	10
62-53-3	Aniline	1	1	3	1	1	3	10
492-80-8	Auramine	2	1	2	2	1	2	10
98-87-3	Benzal chloride	2	1	2	2	1	2	10
98-82-8	Benzene, (1-methylethyl)-	1	2	2	1	2	2	10
610-39-9	Benzene, 4-methyl-1,2-dinitro-	2	1	2	2	1	2	10
1982-69-0	Benzoic acid, 3,6-dichloro-2-methoxy-, sodium salt	2	1	2	2	1	2	10
119-61-9	Benzophenone	2	1	1	2	1	3	10
98-88-4	Benzoyl chloride	2	1	2	2	1	2	10
100-44-7	Benzyl chloride	2	1	2	2	1	2	10
111-44-4	Bis(2-chloroethyl)ether	2	1	3	2	1	1	10
108-60-1	Bis(2-chloroisopropyl)ether	2	1	2	2	1	2	10
80-05-7	Bisphenol A	2	1	2	2	1	2	10
75-25-2	Bromoform	2	1	2	2	1	2	10
104-51-8	Butylbenzene	1	2	2	1	2	2	10
2475-46-9	C.I. disperse blue 3	2	1	2	2	1	2	10
2832-40-8	C.I. Disperse yellow 3	2	2	1	2	2	1	10
51-79-6	Carbamic acid, ethyl ester	2	1	2	2	1	2	10
79-44-7	Carbamic chloride, dimethyl-	2	1	3	2	1	1	10
24934-91-6	Chlormephos	2	1	2	2	1	2	10
999-81-5	Chlormequat chloride	2	1	2	2	1	2	10
108-90-7	Chlorobenzene	2	1	2	2	1	2	10

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
124-48-1	Chlorodibromomethane	2	1	2	2	1	2	10
542-88-1	Chloromethyl ether	2	1	3	2	1	1	10
107-30-2	Chloromethyl methyl ether	2	1	3	2	1	1	10
88-73-3	Chloronitrobenzene, o-	2	1	2	2	1	2	10
95-49-8	Chlorotoluene, o-	2	1	2	2	1	2	10
1319-77-3	Cresol	2	1	3	2	1	1	10
26444-49-5	Cresyl diphenyl phosphate	1	2	1	1	2	3	10
80-15-9	Cumene hydroperoxide	2	1	2	2	1	2	10
506-68-3	Cyanogen bromide	2	1	2	2	1	2	10
66-81-9	Cycloheximide	2	1	2	2	1	2	10
50-18-0	Cyclophosphamide	2	1	3	2	1	1	10
919-86-8	Demeton-S-Methyl	2	1	2	2	1	2	10
103-24-2	Di-2-ethylhexyl azelate	1	3	1	1	3	1	10
131-17-9	Diallyl phthalate	2	1	2	2	1	2	10
132-64-9	Dibenzofuran	1	2	1	1	2	3	10
62-73-7	Dichlorvos	2	1	3	2	1	1	10
103-83-3	Dimethylbenzylamine	2	1	2	2	1	2	10
7398-69-8	Dimethyldiallylammonium chloride	2	1	1	2	1	3	10
1300-71-6	Dimethylphenol	2	1	2	2	1	2	10
145-73-3	Endothall	2	1	2	2	1	2	10
62-50-0	Ethyl methanesulfonate	2	1	3	2	1	1	10
100-41-4	Ethylbenzene	2	1	2	2	1	2	10
2235-25-8	Ethylmercuric phosphate	2	1	1	2	1	3	10
52-85-7	Famphur	2	1	3	2	1	1	10
2164-17-2	Fluometuron	2	1	2	2	1	2	10
640-19-7	Fluoroacetamide	2	1	2	2	1	2	10
2540-82-1	Formothion	2	1	2	2	1	2	10
100-97-0	Hexamethylenetetramine	3	1	1	3	1	1	10
680-31-9	Hexamethylphosphoramide	2	1	3	2	1	1	10
55-91-4	Isofluorphate	2	1	2	2	1	2	10
120-58-1	Isosafrole	2	1	2	2	1	2	10
142-90-5	Lauryl methacrylate	1	3	1	1	3	1	10
148-82-3	Melphalan	2	1	3	2	1	1	10
126-98-7	Methacrylonitrile	2	1	3	2	1	1	10
124-63-0	Methanesulfonyl chloride	2	1	2	2	1	2	10

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
16752-77-5	Methomyl	2	1	2	2	1	2	10
2212-67-1	Molinate	2	1	2	2	1	2	10
110-91-8	Morpholine	2	1	2	2	1	2	10
109-46-6	N,N'-Dibutylthiourea	1	1	3	1	1	3	10
110-26-9	N,N'-Methylenebisacrylamide	2	1	3	2	1	1	10
684-93-5	N-Methyl-N-nitrosourea	2	1	3	2	1	1	10
759-73-9	N-Nitroso-N-ethylurea	2	1	3	2	1	1	10
70-25-7	N-Nitroso-N-methyl-N'-nitroguanidine	2	1	3	2	1	1	10
615-53-2	N-Nitroso-N-methylurethane	2	1	3	2	1	1	10
621-64-7	N-Nitrosodi-n-propyl amine	2	1	3	2	1	1	10
1116-54-7	N-Nitrosodiethanolamine	2	1	3	2	1	1	10
86-30-6	N-Nitrosodiphenylamine	2	1	2	2	1	2	10
4549-40-0	N-Nitrosomethylvinylamine	2	1	3	2	1	1	10
16543-55-8	N-Nitrosonornicotine	2	1	3	2	1	1	10
100-75-4	N-Nitrosopiperidine	2	1	3	2	1	1	10
930-55-2	N-Nitrosopyrrolidine	2	1	3	2	1	1	10
90-30-2	N-Phenyl-1-naphthalenamine	1	2	2	1	2	2	10
126-99-8	Neoprene	2	1	2	2	1	2	10
54-11-5	Nicotine	2	1	2	2	1	2	10
99-09-2	Nitroaniline, m-	2	1	2	2	1	2	10
55-63-0	Nitroglycerine	2	1	2	2	1	2	10
83-41-0	o-Xylene, 3-nitro-	2	1	2	2	1	2	10
152-16-9	Octamethyldiphosphoramide	2	1	2	2	1	2	10
112-80-1	Oleic acid	1	3	1	1	3	1	10
96-09-3	Oxirane, phenyl-	2	1	2	2	1	2	10
98-54-4	p-tert-Butylphenol	2	1	2	2	1	2	10
1114-71-2	Pebulate	1	2	2	1	2	2	10
75-44-5	Phosgene	2	1	3	2	1	1	10
78-42-2	Phosphoric acid, tris(2-ethylhexyl) ester	1	2	2	1	2	2	10
10025-87-3	Phosphorus oxychloride	2	1	2	2	1	2	10
88-89-1	Picric acid	2	1	3	2	1	1	10
12236-62-3	Pigment orange 36	3	1	1	3	1	1	10
6358-31-2	Pigment yellow 74	3	1	1	3	1	1	10
2631-37-0	Promecarb	2	1	2	2	1	2	10
122-42-9	Propham	2	1	2	2	1	2	10

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
53558-25-1	Pyriminil	2	1	2	2	1	2	10
94-59-7	Safrole	2	1	2	2	1	2	10
151-21-3	Sodium lauryl sulfate	2	1	1	2	1	3	10
100-42-5	Styrene	2	1	2	2	1	2	10
75-64-9	Tert-butylamine	2	1	2	2	1	2	10
127-18-4	Tetrachloroethylene	2	1	2	2	1	2	10
629-59-4	Tetradecane	1	3	1	1	3	1	10
62-55-5	Thioacetamide	2	1	3	2	1	1	10
640-15-3	Thiometon	2	1	1	2	1	3	10
23564-05-8	Thiophanate-methyl	2	1	2	2	1	2	10
79-19-6	Thiosemicarbazide	2	1	2	2	1	2	10
823-40-5	Toluene-2,6-diamine	2	1	1	2	1	3	10
126-73-8	Tributyl phosphate	1	2	1	1	2	3	10
79-01-6	Trichloroethylene	2	1	2	2	1	2	10
121-44-8	Triethylamine	2	1	2	2	1	2	10
25551-13-7	Trimethyl benzene (mixed isomers)	2	1	2	2	1	2	10
66-75-1	Uracil mustard	2	1	3	2	1	1	10
75-01-4	Vinyl chloride	2	1	3	2	1	1	10
88-12-0	Vinyl pyrrolidione	2	1	3	2	1	1	10
110-98-5	1,1'-oxybis-2-propanol	2	1	2	2	1	1	9
85-70-1	1,2-Benzenedicarboxylic acid, 2-butoxy-2-oxyethyl butyl ester	1	2	1	1	2	2	9
156-59-2	1,2-Dichloroethene, cis-	2	1	2	2	1	1	9
540-59-0	1,2-Dichloroethylene	2	1	2	2	1	1	9
78-87-5	1,2-Dichloropropane	2	1	2	2	1	1	9
540-73-8	1,2-Dimethylhydrazine	1	1	3	1	1	2	9
156-60-5	1,2-trans-Dichloroethene	2	1	2	2	1	1	9
85-43-8	1,3-Isobenzofurandione, 3a,4,7,7a-tetrahydro-	2	1	1	2	1	2	9
123-91-1	1,4-Dioxane	2	1	2	2	1	1	9
470-82-6	1,8-Epoxy-p-menthane	2	1	2	2	1	1	9
140-31-8	1-Piperazineethanamine	2	1	2	2	1	1	9
108-31-6	2,5-Furandione	2	1	2	2	1	1	9
576-26-1	2,6-Dimethylphenol	1	1	3	1	1	2	9
93-65-2	2-(2-Methyl-4-chlorophenoxy)propionic acid (MCPP)	2	1	2	2	1	1	9
78-51-3	2-Butoxyethanol, phosphate (3:1)	1	2	1	1	2	2	9
2867-47-2	2-Methyl-2-propenoic acid, 2-(dimethylamino)ethyl ester	2	1	2	2	1	1	9

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
120-18-3	2-Naphthalene sulfonic acid	2	1	1	2	1	2	9
107-87-9	2-Pentanone	2	1	2	2	1	1	9
616-45-5	2-Pyrrolidinone	2	1	1	2	1	2	9
3452-97-9	3,5,5-Trimethyl-1-hexanol	2	1	1	2	1	2	9
70-69-9	4-Aminopropiophenone	2	1	2	2	1	1	9
104-94-9	4-Methoxybenzenamine	1	1	2	1	1	3	9
108-89-4	4-Methyl pyridine	2	1	2	2	1	1	9
100-01-6	4-Nitrobenzenamine	2	1	2	2	1	1	9
100-02-7	4-Nitrophenol	2	1	2	2	1	1	9
208-96-8	Acenaphthylene	1	2	1	1	2	2	9
30560-19-1	Acephate	2	1	2	2	1	1	9
650-51-1	Acetic acid, trichloro-, sodium salt	2	1	2	2	1	1	9
102-01-2	Acetoacetanilide	2	1	1	2	1	2	9
506-96-7	Acetyl bromide	2	1	2	2	1	1	9
79-06-1	Acrylamide	1	1	3	1	1	2	9
107-13-1	Acrylonitrile	1	1	3	1	1	2	9
123-77-3	Azodicarbonamide	2	1	2	2	1	1	9
55-21-0	Benzamide	2	1	2	2	1	1	9
98-09-9	Benzenesulfonyl chloride	2	1	1	2	1	2	9
134-20-3	Benzoic acid, 2-amino-, methyl ester	2	1	1	2	1	2	9
532-32-1	Benzoic acid, sodium salt	2	1	1	2	1	2	9
111-91-1	Bis(2-chloroethoxy)methane	2	1	2	2	1	1	9
75-27-4	Bromodichloromethane	2	1	2	2	1	1	9
74-83-9	Bromomethane	2	1	2	2	1	1	9
1689-84-5	Bromoxynil	1	1	2	1	1	3	9
111-36-4	Butyl isocyanate	1	1	3	1	1	2	9
76-22-2	Camphor	2	1	1	2	1	2	9
353-50-4	Carbonic difluoride	1	1	3	1	1	2	9
120-80-9	Catechol	1	1	3	1	1	2	9
79-11-8	Chloroacetic acid	1	1	2	1	1	3	9
74-87-3	Chloromethane	2	1	2	2	1	1	9
1897-45-6	Chlorthalonil	1	1	2	1	1	3	9
57-12-5	Cyanide	1	1	2	1	1	3	9
506-77-4	Cyanogen chloride	1	1	2	1	1	3	9
2636-26-2	Cyanophos	2	1	1	2	1	2	9

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
75-99-0	Dalapon	2	1	2	2	1	1	9
112-30-1	Decyl alcohol	1	2	1	1	2	2	9
75-71-8	Dichlorodifluoromethane	2	1	2	2	1	1	9
26952-23-8	Dichloropropene	2	1	1	2	1	2	9
111-77-3	Diethylene glycol methyl ether	2	1	2	2	1	1	9
112-34-5	Diethylene glycol monobutyl ether	2	1	2	2	1	1	9
57-14-7	Dimethylhydrazine	1	1	3	1	1	2	9
142-84-7	Dipropylamine	2	1	1	2	1	2	9
25265-71-8	Dipropylene glycol	2	1	2	2	1	1	9
541-53-7	Dithobiuret	2	1	2	2	1	1	9
51-43-4	Epinephrine	1	1	3	1	1	2	9
151-56-4	Ethyleneimine	1	1	3	1	1	2	9
97-53-0	Eugenol	2	1	1	2	1	2	9
50-00-0	Formaldehyde	1	1	3	1	1	2	9
765-34-4	Glycidylaldehyde	1	1	3	1	1	2	9
142-82-5	Heptane, n-	1	2	1	1	2	2	9
25339-56-4	Heptene	1	2	1	1	2	2	9
74-90-8	Hydrocyanic acid	1	1	2	1	1	3	9
123-31-9	Hydroquinone	1	1	2	1	1	3	9
74-88-4	Iodomethane	2	1	2	2	1	1	9
108-20-3	Isopropyl ether	2	1	1	2	1	2	9
108-78-1	Melamine	2	1	2	2	1	1	9
1338-23-4	Methyl ethyl ketone peroxide	2	1	1	2	1	2	9
60-34-4	Methyl hydrazine	1	1	3	1	1	2	9
556-61-6	Methyl isothiocyanate	1	1	2	1	1	3	9
120-94-5	Methyl pyrrolidine	2	1	1	2	1	2	9
74-95-3	Methylene bromide	2	1	2	2	1	1	9
1615-80-1	N,N'-Diethylhydrazine	1	1	3	1	1	2	9
127-19-5	N,N'-Dimethylacetamide	2	1	2	2	1	1	9
5064-31-3	N,N-bis(carboxymethyl)-glycine trisodium salt	2	1	2	2	1	1	9
924-16-3	N-Nitrosodi-n-butylamine	1	1	3	1	1	2	9
756-80-9	O,O-Dimethyl phosphorodithioate	2	1	1	2	1	2	9
78-11-5	Pentaerythritol tetranitrate	2	1	2	2	1	1	9
62-44-2	Phenacetin	2	1	2	2	1	1	9
108-95-2	Phenol	1	1	2	1	1	3	9

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CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
106-50-3	Phenylenediamine, p-	2	1	1	2	1	2	9
90-43-7	Phenylphenol, o-	1	1	2	1	1	3	9
103-85-5	Phenylthiourea	2	1	2	2	1	1	9
7719-12-2	Phosphorus trichloride	2	1	1	2	1	2	9
85-44-9	Phthalic anhydride	2	1	2	2	1	1	9
151-50-8	Potassium cyanide	1	1	2	1	1	3	9
333-20-0	Potassium thiocyanate	2	1	1	2	1	2	9
107-12-0	Propionitrile	2	1	2	2	1	1	9
75-56-9	Propylene oxide	2	1	2	2	1	1	9
75-55-8	Propyleneimine	1	1	3	1	1	2	9
110-86-1	Pyridine	2	1	2	2	1	1	9
91-22-5	Quinoline	1	1	3	1	1	2	9
497-19-8	Sodium carbonate	2	1	1	2	1	2	9
143-33-9	Sodium cyanide	1	1	2	1	1	3	9
132-27-4	Sodium-o-phenylphenate	2	1	1	2	1	2	9
95-06-7	Sulfallate	1	1	2	1	1	3	9
64-67-5	Sulfuric acid, diethyl ester	2	1	2	2	1	1	9
97-99-4	Tetrahydrofurfuryl alcohol	2	1	2	2	1	1	9
509-14-8	Tetranitromethane	2	1	2	2	1	1	9
5344-82-1	Thiourea, (2-chlorophenyl)-	2	1	2	2	1	1	9
108-88-3	Toluene	2	1	1	2	1	2	9
95-70-5	Toluene-2,5-diamine	2	1	1	2	1	2	9
75-87-6	Trichloroacetaldehyde	2	1	2	2	1	1	9
75-69-4	Trichlorofluoromethane	2	1	1	2	1	2	9
112-35-6	Triethylene glycol monomethyl ether	2	1	2	2	1	1	9
112-24-3	Triethylene tetramine	2	1	2	2	1	1	9
108-38-3	Xylene, m-	2	1	1	2	1	2	9
95-47-6	Xylene, o-	2	1	1	2	1	2	9
106-42-3	Xylene, p-	2	1	1	2	1	2	9
552-30-7	1,2,4-Benzenetricarboxylic acid, anhydride	2	1	1	2	1	1	8
504-60-9	1,3-Pentadiene	1	1	2	1	1	2	8
120-61-6	1,4-Benzenedicarboxylic acid, dimethyl ester	1	1	2	1	1	2	8
105-67-9	2,4-Dimethylphenol	1	1	2	1	1	2	8
114-26-1	2-(1-Methylethoxy)phenol, methyl carbamate	1	1	2	1	1	2	8
95-57-8	2-Chlorophenol	1	1	2	1	1	2	8

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		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
104-76-7	2-Ethyl-1-hexanol	1	1	2	1	1	2	8
78-79-5	2-Methyl-1,3-butadiene	1	1	2	1	1	2	8
75-65-0	2-Methyl-2-propanol	2	1	1	2	1	1	8
95-53-4	2-Methylaniline	1	1	2	1	1	2	8
135-19-3	2-Naphthol	1	1	1	1	1	3	8
111-13-7	2-Octanone	1	1	2	1	1	2	8
818-61-1	2-Propenoic acid, 2-hydroxyethyl ester	1	1	2	1	1	2	8
106-63-8	2-Propenoic acid, 2-methylpropyl ester	1	1	2	1	1	2	8
95-65-8	3,4-Dimethylphenol	1	1	2	1	1	2	8
542-76-7	3-Chloropropionitrile	2	1	1	2	1	1	8
108-99-6	3-Methyl pyridine	2	1	1	2	1	1	8
106-68-3	3-Octanone	1	1	2	1	1	2	8
106-48-9	4-Chlorophenol	1	1	2	1	1	2	8
110-12-3	5-Methyl-2-hexanone	2	1	1	2	1	1	8
540-88-5	Acetic acid, 1,1-dimethylethyl ester	2	1	1	2	1	1	8
79-10-7	Acrylic acid	1	1	3	1	1	1	8
107-18-6	Allyl alcohol	1	1	2	1	1	2	8
107-11-9	Allylamine	1	1	2	1	1	2	8
115-02-6	Azaserine	1	1	3	1	1	1	8
100-52-7	Benzaldehyde	1	1	2	1	1	2	8
121-57-3	Benzenesulfonic acid, 4-amino	2	1	1	2	1	1	8
141-32-2	Butyl acrylate, n-	1	1	2	1	1	2	8
75-00-3	Chloroethane	2	1	1	2	1	1	8
108-39-4	Cresol, m-	1	1	2	1	1	2	8
95-48-7	Cresol, o-	1	1	2	1	1	2	8
106-44-5	Cresol, p-	1	1	2	1	1	2	8
123-73-9	Crotonaldehyde	1	1	2	1	1	2	8
121-82-4	Cyclotrimethylenetrinitramine	1	1	2	1	1	2	8
123-42-2	Diacetone alcohol	2	1	1	2	1	1	8
111-42-2	Diethanolamine	1	1	2	1	1	2	8
109-89-7	Diethylamine	1	1	2	1	1	2	8
100-37-8	Diethylaminoethanol	2	1	1	2	1	1	8
121-69-7	Dimethylaniline, N,N-	1	1	2	1	1	2	8
68-12-2	Dimethylformamide, N,N-	1	1	2	1	1	2	8
646-06-0	Dioxolane	2	1	1	2	1	1	8

EXHIBIT D-1
Draft Prioritized Chemical List

CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
112-00-5	Dodecyltrimethyl-ammonium chloride	1	1	2	1	1	2	8
64-17-5	Ethyl alcohol	1	1	2	1	1	2	8
60-29-7	Ethyl ether	2	1	1	2	1	1	8
75-04-7	Ethylamine	1	1	2	1	1	2	8
107-15-3	Ethylene diamine	1	1	2	1	1	2	8
111-54-6	Ethylenebisdithiocarbamic acid, salts & esters	2	1	1	2	1	1	8
60-00-4	Ethylenediaminetetraacetic acid	2	1	1	2	1	1	8
115-90-2	Fensulfothion	1	1	2	1	1	2	8
144-49-0	Fluoroacetic acid	1	1	3	1	1	1	8
110-00-9	Furans	1	1	2	1	1	2	8
98-01-1	Furfural	1	1	2	1	1	2	8
107-22-2	Glyoxal	1	1	2	1	1	2	8
78-59-1	Isophorone	2	1	1	2	1	1	8
75-31-0	Isopropylamine	1	1	2	1	1	2	8
97-65-4	Itaconic acid	1	1	2	1	1	2	8
78-97-7	Lactonitrile	1	1	1	1	1	3	8
96-33-3	Methyl acrylate	1	1	2	1	1	2	8
563-80-4	Methyl isopropyl ketone	2	1	1	2	1	1	8
74-93-1	Methyl mercaptan	1	1	2	1	1	2	8
1634-04-4	Methyl-t-butyl ether	2	1	1	2	1	1	8
74-89-5	Methylamine	1	1	2	1	1	2	8
75-09-2	Methylene chloride	1	1	2	1	1	2	8
315-18-4	Mexacarbate	1	1	2	1	1	2	8
2763-96-4	Muscimol	2	1	1	2	1	1	8
124-40-3	N-Methyl methanamine	1	1	2	1	1	2	8
62-75-9	N-Nitrosodimethylamine	1	1	3	1	1	1	8
99-08-1	Nitrotoluene, m-	1	1	2	1	1	2	8
88-72-2	Nitrotoluene, o-	1	1	2	1	1	2	8
99-99-0	Nitrotoluene, p-	1	1	2	1	1	2	8
111-87-5	Octyl alcohol, n-	1	1	2	1	1	2	8
59-50-7	p-Chloro-m-cresol	1	1	1	1	1	3	8
104-15-4	p-Toluenesulfonic acid	2	1	1	2	1	1	8
106-49-0	p-Toluidine	1	1	2	1	1	2	8
123-63-7	Paraldehyde	2	1	1	2	1	1	8
107-19-7	Propargyl alcohol	1	1	2	1	1	2	8

EXHIBIT D-1
Draft Prioritized Chemical List

CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
13952-84-6	Sec-butylamine	1	1	2	1	1	2	8
563-41-7	Semicarbazide hydrochloride	1	1	2	1	1	2	8
540-72-7	Sodium thiocyanate	1	1	2	1	1	2	8
18883-66-4	Streptozotocin	1	1	3	1	1	1	8
109-99-9	Tetrahydrofuran	2	1	1	2	1	1	8
119-64-2	Tetralin	1	1	2	1	1	2	8
112-50-5	Triethylene glycol monoethyl ether	2	1	1	2	1	1	8
75-50-3	Trimethylamine	1	1	2	1	1	2	8
57-13-6	Urea	1	1	2	1	1	2	8
108-05-4	Vinyl acetate	1	1	2	1	1	2	8
1330-20-7	Xylenes	2	1	1	2	1	1	8
75-35-4	1,1-Dichloroethylene	1	1	2	1	1	1	7
111-55-7	1,2-Ethanediol, diacetate	1	1	1	1	1	2	7
108-67-8	1,3,5-Trimethylbenzene	1	1	1	1	1	2	7
108-46-3	1,3-Benzenediol	1	1	1	1	1	2	7
90-15-3	1-Naphthalenol	1	1	1	1	1	2	7
107-10-8	1-Propanamine	1	1	1	1	1	2	7
110-65-6	2-Butyne-1,4-diol	1	1	1	1	1	2	7
77-99-6	2-Ethyl-2-(hydroxymethyl)-1,3-propanediol	1	1	2	1	1	1	7
591-78-6	2-Hexanone	1	1	2	1	1	1	7
868-77-9	2-Methyl-2-propenoic acid, 2-hydroxyethyl ester	1	1	1	1	1	2	7
79-46-9	2-Nitropropane	1	1	2	1	1	1	7
108-11-2	4-Methyl-2-pentanol	1	1	2	1	1	1	7
75-07-0	Acetaldehyde	1	1	2	1	1	1	7
60-35-5	Acetamide	1	1	2	1	1	1	7
64-19-7	Acetic acid	1	1	1	1	1	2	7
108-24-7	Acetic acid, anhydride	1	1	1	1	1	2	7
67-64-1	Acetone	1	1	2	1	1	1	7
75-05-8	Acetonitrile	1	1	2	1	1	1	7
98-86-2	Acetophenone	1	1	2	1	1	1	7
1596-84-5	Alar	1	1	1	1	1	2	7
68603-15-6	Alcohols, C6-C12	1	1	1	1	1	2	7
628-63-7	Amyl acetate	1	1	1	1	1	2	7
71-41-0	Amyl alcohol, n-	1	1	2	1	1	1	7
50-78-2	Aspirin	1	1	2	1	1	1	7

EXHIBIT D-1
Draft Prioritized Chemical List

CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
100-51-6	Benzyl alcohol	1	1	1	1	1	2	7
123-86-4	Butyl acetate, n-	1	1	1	1	1	2	7
71-36-3	Butyl alcohol, n-	1	1	2	1	1	1	7
109-73-9	Butylamine	1	1	1	1	1	2	7
75-15-0	Carbon disulfide	1	1	2	1	1	1	7
74-11-3	Chlorobenzoic acid, p-	1	1	1	1	1	2	7
107-07-3	Chloroethanol	1	1	2	1	1	1	7
460-19-5	Cyanogen	1	1	2	1	1	1	7
110-82-7	Cyclohexane	1	1	1	1	1	2	7
108-93-0	Cyclohexanol	1	1	2	1	1	1	7
108-91-8	Cyclohexylamine	1	1	2	1	1	1	7
287-92-3	Cyclopentane	1	1	1	1	1	2	7
141-28-6	Diethyl adipate	1	1	1	1	1	2	7
84-66-2	Diethyl phthalate	1	1	1	1	1	2	7
111-46-6	Diethylene glycol	1	1	2	1	1	1	7
111-40-0	Diethylene triamine	1	1	2	1	1	1	7
108-83-8	Diisobutyl ketone	1	1	1	1	1	2	7
142-78-9	Dodecanamide, N-(2-hydroxyethyl)-	1	1	1	1	1	2	7
141-43-5	Ethanol amine	1	1	1	1	1	2	7
74-85-1	Ethene	1	1	1	1	1	2	7
140-88-5	Ethyl acrylate	1	1	2	1	1	1	7
105-37-3	Ethyl ester propanoic acid	1	1	1	1	1	2	7
97-63-2	Ethyl methacrylate	1	1	2	1	1	1	7
110-80-5	Ethylene glycol ethyl ether	1	1	2	1	1	1	7
111-76-2	Ethylene glycol monobutyl ether	1	1	2	1	1	1	7
111-15-9	Ethylene glycol monoethyl ether acetate	1	1	1	1	1	2	7
109-86-4	Ethylene glycol monomethyl ether	1	1	2	1	1	1	7
110-49-6	Ethylene glycol monomethyl ether acetate	1	1	2	1	1	1	7
122-99-6	Ethylene glycol monophenyl ether	1	1	2	1	1	1	7
64-18-6	Formic acid	1	1	1	1	1	2	7
66-25-1	Hexanal	1	1	1	1	1	2	7
142-62-1	Hexanoic acid	1	1	1	1	1	2	7
111-27-3	Hexanol	1	1	1	1	1	2	7
7647-01-0	Hydrochloric acid	1	1	2	1	1	1	7
67-63-0	Isopropyl alcohol	1	1	1	1	1	2	7

EXHIBIT D-1
Draft Prioritized Chemical List

CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
7447-41-8	Lithium chloride	1	1	1	1	1	2	7
123-33-1	Maleic hydrazide	1	1	1	1	1	2	7
90-05-1	Methyl catechol, o-	1	1	1	1	1	2	7
79-22-1	Methyl chloroformate	1	1	2	1	1	1	7
108-10-1	Methyl isobutyl ketone	1	1	2	1	1	1	7
624-83-9	Methyl isocyanate	1	1	2	1	1	1	7
80-62-6	Methyl methacrylate	1	1	2	1	1	1	7
96-37-7	Methylcyclopentane	1	1	1	1	1	2	7
139-13-9	N,N-Bis(carboxymethyl)glycine	1	1	2	1	1	1	7
109-60-4	n-Propyl acetate	1	1	1	1	1	2	7
126-30-7	Neopentyl glycol	1	1	2	1	1	1	7
144-62-7	Oxalic acid	1	1	2	1	1	1	7
110-62-3	Pentanal	1	1	1	1	1	2	7
109-66-0	Pentane	1	1	1	1	1	2	7
123-38-6	Propanal	1	1	1	1	1	2	7
144-55-8	Sodium bicarbonate	1	1	1	1	1	2	7
1401-55-4	Tannic acid	1	1	1	1	1	2	7
100-21-0	Terephthalic acid	1	1	2	1	1	1	7
68-11-1	Thioglycolic acid	1	1	1	1	1	2	7
102-71-6	Triethanolamine	1	1	1	1	1	2	7
112-27-6	Triethylene glycol	1	1	2	1	1	1	7
512-56-1	Trimethyl phosphate	1	1	2	1	1	1	7
109-52-4	Valeric acid	1	1	1	1	1	2	7
110-97-4	1,1'-iminobis-2-propanol	1	1	1	1	1	1	6
57-55-6	1,2-Propanediol	1	1	1	1	1	1	6
94-96-2	1,3-Hexanediol, 2-ethyl-	1	1	1	1	1	1	6
78-96-6	1-Amino-2-propanol	1	1	1	1	1	1	6
109-69-3	1-Chlorobutane	1	1	1	1	1	1	6
115-77-5	2,2-Bis(hydroxymethyl)-1,3-propanediol	1	1	1	1	1	1	6
78-92-2	2-Butanol	1	1	1	1	1	1	6
109-06-8	2-Methyl pyridine	1	1	1	1	1	1	6
107-41-5	2-Methyl-2,4-pentanediol	1	1	1	1	1	1	6
79-41-4	2-Methyl-2-propenoic acid	1	1	1	1	1	1	6
584-02-1	3-Pentanol	1	1	1	1	1	1	6
79-20-9	Acetic acid, methyl ester	1	1	1	1	1	1	6

EXHIBIT D-1
Draft Prioritized Chemical List

CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
65-85-0	Benzoic acid	1	1	1	1	1	1	6
58-85-5	Biotin	1	1	1	1	1	1	6
123-72-8	Butanal	1	1	1	1	1	1	6
107-92-6	Butanoic acid	1	1	1	1	1	1	6
141-97-9	Butanoic acid, 3-oxo-, ethyl ester	1	1	1	1	1	1	6
97-88-1	Butyl methacrylate	1	1	1	1	1	1	6
77-92-9	Citric acid	1	1	1	1	1	1	6
108-94-1	Cyclohexanone	1	1	1	1	1	1	6
111-90-0	Diethylene glycol monoethyl ether	1	1	1	1	1	1	6
131-11-3	Dimethyl phthalate	1	1	1	1	1	1	6
67-68-5	Dimethyl sulfoxide	1	1	1	1	1	1	6
141-78-6	Ethyl acetate	1	1	1	1	1	1	6
107-21-1	Ethylene glycol	1	1	1	1	1	1	6
110-17-8	Fumaric acid	1	1	1	1	1	1	6
105-60-2	Hexahydro-2H-Azepin-2-one	1	1	1	1	1	1	6
111-69-3	Hexanedinitrile	1	1	1	1	1	1	6
124-04-9	Hexanedioic acid	1	1	1	1	1	1	6
123-92-2	Isoamyl acetate	1	1	1	1	1	1	6
110-19-0	Isobutyl acetate	1	1	1	1	1	1	6
78-83-1	Isobutyl alcohol	1	1	1	1	1	1	6
121-91-5	Isophthalic acid	1	1	1	1	1	1	6
108-21-4	Isopropyl acetate	1	1	1	1	1	1	6
110-16-7	Maleic acid	1	1	1	1	1	1	6
67-56-1	Methanol	1	1	1	1	1	1	6
110-43-0	Methyl amyl ketone	1	1	1	1	1	1	6
78-93-3	Methyl ethyl ketone	1	1	1	1	1	1	6
590-01-2	n-Butyl propionate	1	1	1	1	1	1	6
71-23-8	n-Propyl alcohol	1	1	1	1	1	1	6
75-52-5	Nitromethane	1	1	1	1	1	1	6
112-05-0	Pelargonic acid	1	1	1	1	1	1	6
25322-68-3	Polyethylene glycol	1	1	1	1	1	1	6
7447-40-7	Potassium chloride	1	1	1	1	1	1	6
56-81-5	Propanetriol	1	1	1	1	1	1	6
79-09-4	Propionic acid	1	1	1	1	1	1	6
123-62-6	Propionic anhydride	1	1	1	1	1	1	6

EXHIBIT D-1
Draft Prioritized Chemical List

CAS NUMBER	CHEMICAL NAME	HUMAN HEALTH RISK POTENTIAL			ECOLOGICAL RISK POTENTIAL			OVERALL CHEMICAL SCORE
		Persistence	Bioaccumulation	Human Toxicity	Persistence	Bioaccumulation	Ecological Toxicity	
69-72-7	Salicylic acid	1	1	1	1	1	1	6
7647-14-5	Sodium chloride	1	1	1	1	1	1	6
110-15-6	Succinic acid	1	1	1	1	1	1	6
112-60-7	Tetraethylene glycol	1	1	1	1	1	1	6

Score Key:
3 - High, 2 - Medium, 1 - Low

APPENDIX E
CHEMICAL LIST INFORMATION

This appendix presents 15 regulatory lists (in Exhibits E-1 through E-5) and two non-regulatory lists (Exhibit E-6) with which each chemical in WMPT is cross-referenced. The regulatory lists cover chemicals of interest under several environmental statutes. Comparison of chemicals in the WMPT against these lists helps identify which chemicals may pose concern in environmental media and indicates which EPA program offices will be concerned and knowledgeable about the chemical. It also indicates potential sources of additional information for the chemical.

As an indicator of the prior and current attention EPA has given to chemicals in WMPT, each chemical is cross-referenced with the 15 regulatory lists shown in Exhibits E-1 through E-5. These regulatory lists cover chemicals of interest under several environmental statutes including the Resource Conservation and Recovery Act (RCRA), the Superfund Amendments and Reauthorization Act (SARA), the Clean Air Act, the Toxic Substances Control Act (TSCA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Clean Water Act.

In addition, WMPT chemicals are also cross-referenced with the two non-regulatory lists shown in Exhibit E-6. These lists are indicators of human occupational exposure concerns developed by non-regulatory agencies.

Note that the regulatory and non-regulatory list information is included in the WMPT for informational purposes only, and has not been incorporated into the human toxicity, ecological toxicity, persistence, bioaccumulation potential, or mass scoring. Also note that the chemical lists may include chemical categories (e.g., mercury compounds) in additon to or instead of certain individual chemicals. Thus, a user may encounter a situation where a particular chemical belongs to a listed chemical category, and the WMPT may not show that particular chemical as being a member of any of the 17 lists because the WMPT matches the chemical members to the lists by CAS number only.

REFERENCES FOR NON-REGULATORY LISTS

National Institute for Occupational Safety and Health (NIOSH). 1993. *NIOSH Pocket Guide to Chemical Hazards.* U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention.

American Council of Governmental Industrial Hygienists (ACGIH). 1994. *1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.*

EXHIBIT E-1
U.S. EPA Office of Solid Waste and Emergency Response Regulatory Lists

Chemical List	Contents and Source
P Hazardous Waste Constituents	Chemicals from RCRA P list (40 CFR 261.33)—acute hazardous waste.
U Hazardous Waste Constituents	Chemicals from RCRA U list (40 CFR 261.33)—toxic wastes.
RCRA Section 3001 Hazardous Wastes, Appendix VIII Hazardous Constituents	These are hazardous constituents of hazardous waste streams. The waste streams are covered by CERCLA; however, the constituents are not specifically covered by CERCLA (40 CFR 261).
RCRA Section 3001 Hazardous Wastes, Appendix IX Ground Water Monitoring List	Ground water is monitored for these constituents at RCRA land-based hazardous waste disposal units (40 CFR 264).
Superfund Amendments and Reauthorization Act Section 313	These are the chemicals included in the Toxics Release Inventory under the SARA Title III Section 313 (40 CFR 372.65).
Superfund Amendments and Reauthorization Act Section 302 (a)(2)	This list includes the 366 "Extremely Hazardous Substances" as listed under the SARA Title III Section 302 (40 CFR 355, Appendix A).
Superfund Amendments and Reauthorization Act Section 110	The list of chemicals the Agency for Toxic Substances and Disease Registry (ATSDR) is to investigate under SARA Section 104(6)(a). (52 FR 12866, April 17; 1987; 53 FR 41280, October 26, 1988; 54 FR 43615, October 17, 1990).

EXHIBIT E-2
U.S. EPA Office of Air and Radiation Regulatory Lists

Chemical List	Contents and Source
Clean Air Act Amendments Title III Hazardous Air Pollutants	The hazardous air pollutants in the Clean Air Act Amendments of 1990, Title III are listed (PL 101-549, Sec. 301).
Clean Air Act Amendments Section 602 and the Clean Air Act Section 112(r)	The Clean Air Act Amendments section 602 list consists primarily of chlorofluorocarbons, the Clean Air Act 112(r) list is comprised of regulated toxic substances and a list of regulated flammable substances (PL 101-549, Sec. 602 (b)).

EXHIBIT E-3
U.S. EPA Office of Pollution Prevention and Toxics Regulatory Lists

Chemical List	Contents and Source
Chemicals on Reporting Rules (CORR)	The Chemicals on Reporting Rules database contains lists of chemical substances, chemical categories and mixtures that are or have been the subject of all proposed or final TSCA regulations.
On EPA's Office of Pollution Prevention and Toxics Master Testing List	The Master Testing List developed by the Office of Pollution Prevention and Toxics to identify testing needs and priorities and to establish an agenda for testing chemicals under the authority of TSCA Section 4 (December, 1992).

EXHIBIT E-4
U.S. EPA Office of Water Regulatory Lists

Chemical List	Contents and Source
Clean Water Act Priority Pollutants	The list consists of the 126 Priority Pollutants in the Clean Water Act (40 CFR 423, Appendix A).
Safe Drinking Water Act Contaminants	The list of contaminants required to be regulated by the Safe Drinking Water Act Amendments of 1986 (40 CFR 141.11, .12, .13, .15, .16, .61, .62, .63) and the Drinking Water Priority List (56 FR 1470, January 14, 1991).
Clean Water Act Section 311(b)(2)(A) Hazardous Substances	Hazardous substances listed in Section 311 of the Clean Water Act are those which, when discharged into waters, "present an imminent and substantial danger to the public health or welfare, including, but not limited to, fish, shellfish, wildlife, shorelines and beaches" (40 CFR 116.4).

EXHIBIT E-5
U.S. Occupational Safety and Health Administration (OSHA) Regulatory List

Chemical List	Contents and Source
OSHA Permissible Exposure Limits	OSHA permissible exposure limits as a time-weighted average (TWA) concentrations which must not be exceeded during any 8 hour shift of a 40-hour workweek, short-term exposure limits (STEL), or ceiling concentrations.

EXHIBIT E-6
Non-regulatory Chemical Lists of Interest

Chemical List	Co. .ents and Source
NIOSH Recommended Exposure Limits and Immediately Dangerous to Life and Health Limits	NIOSH recommended exposure limits (RELs) as time weighted average (TWA) concentrations for up to a 10 hour work day during a 40-hour workweek, short-term exposure limits (STEL), ceiling RELs, or immediately dangerous to life and health (IDLH) concentrations.
ACGIH Threshold Limit Values	ACGIH threshold limit values as time-weighted average (TWA) concentrations which must not be exceeded during any 8 hour shift of a 40-hour workweek, short-term exposure limits (STEL), or ceiling concentrations.

APPENDIX F
CHEMICAL-RCRA WASTE CODE CROSSWALK

This appendix provides the background on how the links between chemicals and RCRA waste codes were developed. Section F.1 provides an introduction to the crosswalk, section F.2 describes the structure of the crosswalk and how it was created, section F.3 includes abbreviated versions of the crosswalk tables, and section F.4 lists the references.

F.1 INTRODUCTION

The *Chemical-RCRA Waste Code Crosswalk* designates possible links between about 500 chemicals and nearly 600 RCRA hazardous waste codes that are likely to be associated with these chemicals. The crosswalk provides two useful services:

- The crosswalk can be used to identify RCRA waste codes and, subsequently, waste streams that are likely to contain a particular chemical.
- The crosswalk can be used to identify chemicals likely to be present in particular waste streams.

The crosswalk provides a means of translating between priority chemicals (e.g., high-ranking chemical on the Draft Prioritized Chemical List (PCL)) and the RCRA hazardous waste codes and waste streams that may contain them. The crosswalk has been integrated in the WMPT so that associations between chemicals and waste codes can be generated automatically.

What is a RCRA Hazardous Waste Code?

A RCRA hazardous waste code is a label (e.g., F027) placed on a certain type of statutorily defined hazardous waste. Most waste codes define waste that contains a certain chemical or define waste that comes from a certain industrial process. Many wastes are designated by more than one code.

What is a Chemical Name?

A chemical name is generally used to identify a specific chemical. In practice, however, many names (i.e., synonyms) can refer to the same chemical. Furthermore, some chemical names refer to groups of chemicals with the same basic structure (i.e., isomers) or to chemicals that have a common structural unit (e.g., cyanides).

F.2 DESCRIPTION OF THE CROSSWALK

F.2.1 Structure of the Crosswalk

The crosswalk consists of a series of tables with chemical names and CAS numbers listed on one axis and RCRA D, F, K, P and U hazardous waste codes listed on the other axis, with notations in the cells to mark any association between the chemicals and the waste codes. The tables are separated into wastewaters and non-wastewaters. Listed in Exhibit F-1 are the ten tables that comprise the crosswalk, the number of RCRA waste codes included in each table, and the number of chemicals included in each table.

EXHIBIT F-1
Summary Information on the Crosswalk Tables

Table Number	RCRA Waste Code Category	Number of Codes	Number of Chemicals
1	D Codes, Wastewaters	40	41
2	D Codes, Non-wastewaters	41	46
3	F Codes, Wastewaters	28	241
4	F Codes, Non-wastewaters	28	262
5	K Codes, Wastewaters	113	190
6	K Codes, Non-wastewaters	114	184
7	P Codes, Wastewaters	124	140
8	P Codes, Non-wastewaters	124	137
9	U Codes, Wastewaters	271	294
10	U Codes, Non-wastewaters	271	293

Although the axes of the crosswalk contain the chemical names and the RCRA waste codes (specific D, F, K, P, and U codes), the body of the crosswalk contains notations that identify the data sources that indicate an association between the chemicals and waste codes. The notations include the letters D, L, and H, which are explained in the next section.

To facilitate use of the tables, the chemical names are listed in alphabetical order. To allow for a consistent approach for the alphabetization, the prefix of the chemical name (e.g., 1,2-, o-, trans-) has been moved to the end of the chemical name and separated from the name by a comma.

Where multiple synonyms exist to name the same chemical, only one synonym is selected and used consistently throughout the crosswalk tables. In some cases, a more common synonym is used as the chemical name in the crosswalk in place of a less common synonym found in the crosswalk data sources (e.g., CFR).

F.2.2 Approach Used to Develop the Crosswalk

To generate the crosswalk, data were collected from three sources, entered into tables, and reviewed for accuracy. The data in the crosswalk include national-level waste characterization data from the following sources:

- U.S. EPA's hazardous waste listings
- Land Disposal Restrictions (LDR) treatment standards
- Hazardous Waste Identification Rule (HWIR) database[1]

Exhibit F-2 summarizes the three data sources.

[1] The HWIR Process Waste Model database, compiled by U.S. EPA's Economics, Methods, and Risk Assessment Division, includes data from the 1986 Generator Survey that were selectively updated during 1995.

EXHIBIT F-2
Data Sources for Lists of Chemicals Associated with RCRA Waste Codes

Letter	Data Source	Explanation
D, for definition data	D Codes: 40 CFR 261.24, Table 1 F and K Codes: Appendix VII to 40 CFR 261 P and U Codes: 40 CFR 261.33	*Regulatory definition of the waste code.* Regulatory language that identifies wastes as hazardous.
L, for LDR data	D, F, K, P, and U Codes: 40 CFR 268.40	*Land Disposal Restrictions standards.* Treatment standards for hazardous waste prior to land disposal.
H, for HWIR data	F and K Codes only: HWIR Database	*Hazardous Waste Identification Rule database.* Waste data gathered as part of identifying waste that could "exit" the hazardous waste classification system.

Each of these three types of data (D, L, and H) is described in more detail in the sections that follow. The need to develop separate crosswalk tables for wastewaters and non-wastewaters is also addressed.

Definition Data

The waste code definitions found in the Code of Federal Regulations (CFR) were developed to define and categorize hazardous wastes. Exhibit F-2 lists the actual CFR citations for the RCRA hazardous waste codes, and Exhibit F-3 provides general descriptions of each waste code type. Waste code definitions often provide an indication of the underlying constituents to be found in waste that carries that waste code. This observation holds particularly true for D, P, and U codes, which tend to be associated with one chemical per code (although some of the associations are to chemical categories rather than individual chemicals). Conversely, F and K codes are generally associated with multiple chemicals because the codes are defined by the process generating the waste rather than the chemicals that are present in the waste.

EXHIBIT F-3
RCRA Waste Code Categories

D	Characteristic hazardous waste
F	Hazardous waste from non-specific sources
K	Hazardous waste from specific sources
P	Discarded commercial chemical products, off-specification species, container residuals, and spill residues thereof—acute hazardous waste
U	Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof—toxic wastes

LDR Data

The LDRs include treatment standards for waste that is land disposed. Some of the LDR treatment standards are maximum allowable concentrations (e.g., 0.8 mg/L) and others are specified treatment technologies (e.g., biodegradation). The table of LDR treatment standards in the CFR is organized according to individual chemicals (or categories) expected to occur in each RCRA hazardous waste code.

For the purposes of this crosswalk, only those constituents with concentration standards were included in the matrices (and identified with an "L"); constituents with only technology standards were excluded.[2]

According to the definition data (i.e., "D" data), most D, P, and U codes are defined as associated with single chemicals (i.e., a one-waste-code-to-one-chemical relationship). LDR data, however, often associate a waste code with more than one chemical. U.S. EPA decided to retain the LDR data in the D, P, and U code crosswalk tables (even though it may indicate multiple associations for these single-chemical defined waste codes) because the LDR data add useful information on the compounds into which a chemical would dissociate or transform when in actual waste. For example, the definition data specify that waste code P013 is defined as "barium cyanide." In contrast, the LDR data associate P013 with the two ions that "barium cyanide" would dissociate into in solution, specifically, "barium" and "cyanide." Therefore, to maintain a more complete picture of the chemicals that potentially would be found in (i.e., associated with) the waste defined by a waste code (and vice versa), the LDR data have been included in the D, P, and U waste code crosswalk tables.

HWIR Data

The HWIR data included in the crosswalk are from the HWIR Process Model Database (U.S. EPA, 1995). The database includes waste constituents reported in the 1986 Generator Survey, which was updated and revised as part of the analyses supporting HWIR. The database consists of a list of chemicals found in waste streams and the associated list of waste codes for the specific waste streams. For each combination of RCRA waste code and chemical, the database lists the number of "occurrences" (i.e., the number of waste streams where that code and chemical are both present). The approach used to create the HWIR database becomes a limitation when a waste stream carries multiple waste codes because the entire list of chemicals for the waste stream is shown as associated with each of the individual codes. To lessen the effects of potential mis-associations included in this data source, U.S. EPA took the following steps:

(1) U.S. EPA eliminated from the database the waste code-chemical combinations that had no occurrences (i.e., number of occurrences = 0) or an extremely low number of occurrences (i.e., number of occurrences = 1).

(2) For each of the remaining chemicals, U.S. EPA sorted the waste codes associated with the chemical from the highest to the lowest number of occurrences, and only included those waste codes that contributed to the cumulative 90 percent of all occurrences for that chemical. In other words, U.S. EPA discarded waste codes in the tail of the distribution that made up the lowest 10 percent of occurrences.

For two types of RCRA waste codes (F and K codes), the HWIR database provides useful information because F and K codes are defined in the CFR as encompassing wastes from general processes (i.e., there is no specific list of chemicals that each code encompasses). For D, P, and U codes, however, a specific chemical is assigned in the CFR to each individual waste code and any additional HWIR data is most likely superfluous. Therefore, U.S. EPA did not include associations based on the HWIR database in the P and U code matrices. (HWIR data were not available for D waste codes.)

[2] Associations based on LDR concentration standards were included in the crosswalk because they were readily available electronically. U.S. EPA is considering adding associations based on LDR technology standards to the crosswalk. Such additions are only expected to contribute a few associations that do not already exist in the crosswalk (i.e., most of the LDR technology standards are for chemical-waste code associations that are already in the crosswalk based on the other two data sources, primarily the definition "D" data source).

Separate Crosswalks Prepared for Wastewaters and Non-wastewaters

Two of the data sources (L and H) used to generate the crosswalk make a distinction between the wastewater and non-wastewater forms of waste. Based on the form, these sources supply different information on which chemicals are likely to be associated with the waste. To accommodate the differing data for wastewater and non-wastewater forms of waste, separate tables for each of these waste forms were constructed for each of the RCRA waste code categories (D, F, K, P, and U). Unlike the L and H data sources, the definition (D) data source does not use such a distinction and, therefore, all data from the "D" source are included identically in both wastewater and non-wastewater tables.

To help users understand and use the crosswalk, U.S. EPA has defined wastewaters and non-wastewaters and developed an algorithm that can be used to differentiate between them. The definition is taken from the LDR, and the algorithm uses data from the Biennial Reporting System (BRS) to distinguish between wastewaters and non-wastewaters.

LDR Definition

In 40 CFR 268.2, the LDR defines wastewaters as "wastes that contain less than one percent by weight total organic carbon (TOC) and less than one percent by weight total suspended solids (TSS)." Non-wastewaters are defined as wastes that do not meet the criteria for wastewaters. These definitions are useful if TOC and TSS sampling data are available for the wastes of interest. If the user does not have such data, however, the algorithm presented in the next section may be more useful.

Algorithm for BRS Data

Another source of information that can be used to differentiate between wastewaters and non-wastewaters is the BRS reporting forms. The BRS reporting forms do not contain a data field that indicates positively whether a hazardous waste stream is wastewater or non-wastewater, but U.S. EPA has developed an algorithm[3] that uses some of the data provided on the BRS reporting form to determine if the waste is wastewater or non-wastewater. The algorithm uses both the "waste form code" and the "system type" in which the waste is managed to make a rough judgment as to whether a particular waste is wastewater or non-wastewater. This means that if the BRS respondent indicated that the physical/chemical form of the waste (i.e., waste form code) was similar to that of wastewater (or non-wastewater) or if the manner in which the waste was managed (i.e., system type) was similar to the processes used to manage wastewater (or non-wastewater), then the waste is classified accordingly. The actual algorithm is as follows:

Step 1 Wastes with waste form codes that are clearly reserved for non-wastewaters are classified as non-wastewaters (irrespective of the system types in which the wastes are managed). Waste form codes that are reserved for non-wastewaters are B001-B009, B301-B319, B401-B409, B501-B519, B601-B609, B701, and B801.

Step 2 If the waste form code does not match any of the codes listed in Step 1, then the waste form code is compared to the list of codes that are reserved for wastewaters. If a match occurs, then the waste is considered wastewater. The waste form codes that are reserved for wastewaters are B101, B102, B105, and B110-116.

[3] The algorithm presented here was developed recently by U.S. EPA for the National Hazardous Waste Constituent Survey.

Step 3 If no match was found in Step 2, then the system type code is compared to the list of wastewater system type codes. If a match occurs, then the waste is considered wastewater. The system type codes that are wastewater system type codes are M071-M079, M081-M085, M089, M091-M094, M099, M121-M124, and M134-136.

Step 4 If no match was found in Step 3, then the waste is classified as non-wastewater.

The crosswalk user will want to keep in mind that the above algorithm provides only general guidance and should be considered secondary to higher-quality data (e.g., TSS, TOC, direct documentation) that indicate whether a waste is wastewater or non-wastewater. Also, the above algorithm may, in some cases, err on the side of classifying waste as non-wastewater rather than wastewater.

F.2.3 Quality of Associations in the Crosswalk

Because the crosswalk includes data from three different sources, the body of the tables or matrices contains one of the several possible combinations of data sources that indicate associations; these combinations are listed in Exhibit F-4.

Related to the quality of the associations between chemicals and the RCRA waste codes, in general, the more sources that indicate an association exists, the more likely it is that the association exists in real waste. There are, however, exceptions to this logic:

- A single association is actually quite strong for some waste codes, such as the single-chemical-defined D (i.e., D004-D043), P, and U waste codes.

EXHIBIT F-4
Possible Combinations of Data Sources

Possible Combinations of Data Sources	Category
Blank	No Data
D L H	Single Association
D/L D/H L/H	Double Association
D/L/H	Triple Association

- Some waste codes (i.e., D, P, and U) do not have HWIR (i.e., "H" data) included in their tables either due to lack of availability or it being inappropriate to include HWIR data (see section F.2.2), and, thus, can only achieve certain single (D, L) and double associations (D/L).

As for a hierarchy among the three individual data sources, it is very difficult to judge the relative quality of "D" vs. "L" vs. "H" data. For example, it is not clear whether regulatory definition data from a number of years ago (i.e., D data) are more accurate than data from more recent prevalence counts (i.e., H data).

F.2.4 Overlap Analysis

U.S. EPA determined the overlap between the chemicals in the crosswalk and those listed as the "RCRA universe" chemicals. The "RCRA universe" chemicals are defined as Appendix VIII Hazardous Constituents, chemicals on the Appendix IX Ground Water Monitoring List, and chemicals listed as RCRA P and U wastes. The interest in describing such an overlap analysis is to indicate the amount of coverage that the crosswalk provides to users interested in RCRA chemicals. The results are as follows:

- Out of the 507 chemicals in the RCRA universe, 468 (92%) appear in the matrices as found in wastewaters and associated with at least one waste code. These 468 chemicals represent 95% of the total list of wastewater chemicals in the matrices (495).

- Out of the 507 RCRA chemicals, 469 (93%) appear in the matrices as found in non-wastewaters and associated with at least one waste code. These 469 chemicals represent 95% of the total list of non-wastewater chemicals in the matrices (495).

- All but four chemicals overlap between the wastewaters list and the non-wastewaters list. Two chemicals are unique to each list.

- Out of the 507 chemicals in the RCRA universe, 387 (76%) appear on the PCL. Of these 387 chemicals, 365 (72%) appear in the matrices as found in wastewaters and associated with at least one waste code. These 365 chemicals represent 74% of the total list of wastewater chemicals in the matrices (495).

- Out of the 387 RCRA chemicals (or 76 percent) that appear on the PCL, 364 (72%) appear in the matrices as found in non-wastewaters and associated with at least one waste code. These 364 chemicals represent 74% of the total list of non-wastewater chemicals in the matrices (495).

F.2.5 Caveats and Important Assumptions

In using the crosswalk, the user should be aware of several limitations. Some of these limitations have been incorporated in the preceding discussion of the crosswalk structure and development. Additional important limitations are listed and discussed below.

- The D, L, and H associations (singly or in combination) provided in the crosswalk are indicative but do not definitively link chemicals and waste codes. In some cases, the data are dated and may not accurately represent current waste characteristics. Additionally, all of these sources were intended to identify characteristics on a national, rather than a facility, level.

- Some chemicals of interest (which may be present in wastes) may not appear in the crosswalk.

- Some RCRA waste codes do not appear in the crosswalk. For example, the ignitability and corrosivity characteristic codes (D001-D002) do not appear in the crosswalk and the reactive characteristic code (D003) has only one association included, because chemicals that are typically associated with these three waste codes are difficult to identify. This lack of information can be an issue because significant quantities of hazardous waste streams may be identified only by these waste codes. Other codes that were used in the past but are no longer in use (e.g., U230, U231, U232, U233, and U242 were replaced by F027), do not appear in the crosswalk.

- Because some chemicals are known by various names, finding a specific chemical name may not be possible. Instead, using the chemical's CAS number will assist in finding the desired chemical in the crosswalk.

- Chemical categories can overlap with individual chemicals and make use of the crosswalk more involved. For example, the individual chemical 1,2-dichlorobenzene is included in the crosswalk as is the chemical category "dichlorobenzene (mixed isomers)," which

includes 1,2-dichlorobenzene as well as other isomers. See Exhibit F-5 below for a list of chemical categories from the three data sources (D, L, and H) included in the crosswalk.

EXHIBIT F-5
Chemical Categories Included in the Crosswalk

Chemical Category	CAS Number
Categories or Chemical Names That Are Mixed Isomers	
Cresol	1319-77-3
Dichlorobenzene (mixed isomers)	25321-22-6
Dichloroethene	25323-30-2
Dichloropropane	26638-19-7
Dichloropropene	26952-23-8
Dichloropropylene, 1,3-	542-75-6
Dinitrobenzene (mixed isomers)	25154-54-5
Endosulfan	115-29-7
Hexachlorodibenzo-p-dioxins	34465-46-8
Hexachlorodibenzofurans	55684-94-1
Pentachlorodibenzo-p-dioxins	36088-22-9
Pentachlorodibenzofurans	30402-15-4
Phenylenediamine (mixed isomers)	25265-76-3
Tetrachloroethane	25322-20-7
Tetrachlorophenol	25167-83-3
Trichloroethane	25323-89-1
Trichlorophenol	25167-82-2
Broad Categories	
Coal tars	8007-45-2
Dithiocarbamates	--
Phosphorodithioc acid esters	--
Polychlorinated biphenyls	1336-36-3

Categories Represented by CAS Number for Parent Compound

Parent Compound	CAS Number	Category Represented
Chromium	7440-47-3	Chromium and compounds
Cyanide	57-12-5	Cyanides (total or amenable)
Nicotine	54-11-5	Nicotine and salts
Strychnine	57-24-9	Strychnine and salts
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	1746-01-6	Tetrachlorodibenzo-p-dioxins
Tetrachlorodibenzofuran, 2,3,7,8-	51207-31-9	Tetrachlorodibenzofurans
Warfarin	81-81-2	Warfarin and salts

F.3 THE CROSSWALK

For illustrative purposes, the first page of each of the ten tables that make up the crosswalk is included at the end of this appendix. The full set of crosswalk tables (approximately 120 pages) is available in the U.S. EPA RCRA docket as document number EPA530-D-97-003. Contact the RCRA Hotline (1-800-424-9346) to obtain a copy of this document.

F.4 REFERENCES

U.S. Environmental Protection Agency (U.S. EPA). July 1, 1996 edition. *Code of Federal Regulations*, Title 40, Part 261.24, Table 1. Washington, DC.

U.S. Environmental Protection Agency (U.S. EPA). July 1, 1996 edition. *Code of Federal Regulations*, Title 40, Part 261, Appendix VII. Washington, DC.

U.S. Environmental Protection Agency (U.S. EPA). July 1, 1996 edition. *Code of Federal Regulations*, Title 40, Part 261.33. Washington, DC.

U.S. Environmental Protection Agency (U.S. EPA). July 1, 1996 edition. *Code of Federal Regulations*, Title 40, Part 268.40. Washington, DC.

U.S. Environmental Protection Agency (U.S. EPA). March 15, 1995. *Quick Response Task 6—Comparison of Constituents for Listed Waste Codes*. Washington, DC: Office of Solid Waste. Memorandum.

TABLE 1: Crosswalk for D Codes, Wastewaters

CAS #	Constituent Name	D004	D005	D006	D007	D008	D009	D010	D011	D012	D013	D014	D015	D016	D017	D018	D019	D020	D021	D022	D023	D024	D025	D026	D027	D028	D029	D030	D031	D032	D033	D034	D035	D036	D037	D038	D039	D040	D041	D042	D043
7440-38-2	ARSENIC	D/L																																							
7440-39-3	BARIUM		D/L																																						
71-43-2	BENZENE															D/L																									
58-89-9	BHC, GAMMA- (LINDANE)										D																														
7440-43-9	CADMIUM			D/L																																				
56-23-5	CARBON TETRACHLORIDE																D/L																								
57-74-9	CHLORDANE																	D/L																							
108-90-7	CHLOROBENZENE																		D/L																						
67-66-3	CHLOROFORM																			D/L																					
7440-47-3	CHROMIUM				D/L																																				
108-39-4	CRESOL, M-																					D/L																			
95-48-7	CRESOL, O-																				D/L																			
106-44-5	CRESOL, P-																						D/L																	
1319-77-3	CRESOLS (MIXED ISOMERS)																							D/L																
106-46-7	DICHLOROBENZENE, 1,4-																								D/L															
107-06-2	DICHLOROETHANE, 1,2-																									D/L														
75-35-4	DICHLOROETHYLENE, 1,1-																										D/L													
94-75-7	DICHLOROPHENOXYACETIC ACID, 2,4- (2,4-D)													D														D/L												
121-14-2	DINITROTOLUENE, 2,4-																												D/L											
72-20-8	ENDRIN									D																														
76-44-8	HEPTACHLOR																												D/L											
1024-57-3	HEPTACHLOR EPOXIDE																												D/L											
118-74-1	HEXACHLOROBENZENE																													D/L										
87-68-3	HEXACHLOROBUTADIENE																														D/L									
67-72-1	HEXACHLOROETHANE																															D/L								
7439-92-1	LEAD					D/L																																		
7439-97-6	MERCURY						D/L																																	
72-43-5	METHOXYCHLOR											D																												
78-93-3	METHYL ETHYL KETONE																																D/L							
98-95-3	NITROBENZENE																																	D/L						
87-86-5	PENTACHLOROPHENOL																																		D/L					
110-86-1	PYRIDINE																																			D/L				
7782-49-2	SELENIUM						D/L																																	
7440-22-4	SILVER								D/L																															
93-72-1	SILVEX (2,4,5-TP)														D																									
127-18-4	TETRACHLOROETHYLENE																																			D/L				
8001-35-2	TOXAPHENE												D																											
79-01-6	TRICHLOROETHYLENE																																				D/L			
95-95-4	TRICHLOROPHENOL, 2,4,5-																																					D/L		
88-06-2	TRICHLOROPHENOL, 2,4,6-																																						D/L	
75-01-4	VINYL CHLORIDE																																							D/L

D = CFR definition of the waste code
L = Land Disposal Restrictions

TABLE 2: Crosswalk for D Codes, Non-wastewaters

CAS #	Constituent Name	D003	D004	D005	D006	D007	D008	D009	D010	D011	D012	D013	D014	D015	D016	D017	D018	D019	D020	D021	D022	D023	D024	D025	D026	D027	D028	D029	D030	D031	D032	D033	D034	D035	D036	D037	D038	D039	D040	D041	D042	D043
7440-38-2	ARSENIC		D/L																																							
7440-39-3	BARIUM			D/L																																						
71-43-2	BENZENE																D/L																									
319-84-6	BHC, ALPHA-											L																														
319-85-7	BHC, BETA-											L																														
319-86-8	BHC, DELTA-											L																														
58-89-9	BHC, GAMMA- (LINDANE)											D/L																														
7440-43-9	CADMIUM				D/L																																				
56-23-5	CARBON TETRACHLORIDE																	D/L																								
57-74-9	CHLORDANE																		D/L																							
108-90-7	CHLOROBENZENE																			D/L																						
67-66-3	CHLOROFORM																				D/L																					
7440-47-3	CHROMIUM					D/L																																				
108-39-4	CRESOL, M-																						D/L																			
95-48-7	CRESOL, O-																					D/L																			
106-44-5	CRESOL, P-																							D/L																	
1319-77-3	CRESOLS (MIXED ISOMERS)																								D/L																
57-12-5	CYANIDES (TOTAL or AMENABLE)	L																								D/L															
106-46-7	DICHLOROBENZENE, 1,4-																										D/L														
107-06-2	DICHLOROETHANE, 1,2-																											D/L													
75-35-4	DICHLOROETHYLENE, 1,1-																												D/L												
94-75-7	DICHLOROPHENOXYACETIC ACID, 2,4- (2,4-D														D/L																										
121-14-2	DINITROTOLUENE, 2,4-																													D/L											
72-20-8	ENDRIN										D/L																														
7421-93-4	ENDRIN ALDEHYDE										L																														
76-44-8	HEPTACHLOR																													D/L											
1024-57-3	HEPTACHLOR EPOXIDE																													D/L											
118-74-1	HEXACHLOROBENZENE																														D/L										
87-68-3	HEXACHLOROBUTADIENE																															D/L									
67-72-1	HEXACHLOROETHANE																																D/L								
7439-92-1	LEAD						D/L																																		
7439-97-6	MERCURY							D/L																																	
72-43-5	METHOXYCHLOR												D/L																												
78-93-3	METHYL ETHYL KETONE																																	D/L							
98-95-3	NITROBENZENE																																		D/L						
87-86-5	PENTACHLOROPHENOL																																			D/L					
110-86-1	PYRIDINE																																				D/L				
7782-49-2	SELENIUM								D/L																																
7440-22-4	SILVER									D/L																																
93-72-1	SILVEX (2,4,5-TP)															D/L																										
127-18-4	TETRACHLOROETHYLENE																																					D/L				
8001-35-2	TOXAPHENE													D/L																												
79-01-6	TRICHLOROETHYLENE																																					D/L				
95-95-4	TRICHLOROPHENOL, 2,4,5-																																						D/L			
88-06-2	TRICHLOROPHENOL, 2,4,6-																																							D/L		
75-01-4	VINYL CHLORIDE																																									D/L

D = CFR definition of the waste code
L = Land Disposal Restrictions

Table 2
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TABLE 3: Crosswalk for F Codes, Wastewaters

CAS #	Constituent Name	F001	F002	F003	F004	F005	F006	F007	F008	F009	F010	F011	F012	F019	F020	F021	F022	F023	F024	F025	F026	F027	F028	F032	F034	F035	F037	F038	F039
83-32-9	ACENAPHTHENE																										L		D
208-96-8	ACENAPHTHYLENE																												D/L
67-64-1	ACETONE	L/H	L/H	L/H	L	L/H	H																						D/L/H
75-05-8	ACETONITRILE	H	H	H		H																							D/L
98-86-2	ACETOPHENONE																												D/L/H
107-02-8	ACROLEIN																												D/L
107-13-1	ACRYLONITRILE		H	H																									D/L/H
309-00-2	ALDRIN																												D/L
20859-73-8	ALUMINUM PHOSPHATE						H																						
92-67-1	AMINOBIPHENYL, 4-																												D/L
62-53-3	ANILINE		H	H																									D/L/H
120-12-7	ANTHRACENE						H																						D/L
7440-36-0	ANTIMONY	H	H	H		H	H	H	H	H				H										D	D	D			D/L/H
140-57-8	ARAMITE																												D/L
7440-38-2	ARSENIC	H	H	H		H	H	H	H	H				H										D	D	D			D/L/H
7440-39-3	BARIUM	H	H	H		H	H	H	H	H				H															D/L/H
542-62-1	BARIUM CYANIDE						H																						
56-55-3	BENZ(A)ANTHRACENE																							D	D		L		D/L
71-43-2	BENZENE	L/H	L/H	L/H	L/H	D/L/H	H												D	D							D/L	D/L	D/L/H
218-01-9	BENZO(A)PHENANTHRENE	H		H			H																				D/L	D/L	D/L
205-99-2	BENZO(B)FLUORANTHENE																												D/L
207-08-9	BENZO(K)FLUORANTHENE																								D				D/L
50-32-8	BENZO(A)PYRENE																							D	D		D/L	D/L	D/L
191-24-2	BENZO(G,H,I)PERYLENE																												D/L
7440-41-7	BERYLLIUM	H	H	H		H	H	H	H	H				H															D/L/H
319-84-6	BHC, ALPHA-																												D/L
319-85-7	BHC, BETA-																												D/L
319-86-8	BHC, DELTA-																												D/L
58-89-9	BHC, GAMMA-																												D/L
111-44-4	BIS(2-CHLOROETHYL)ETHER																												D/L
39638-32-9	BIS(2-CHLOROISOPROPYL) ETHER																												D/L
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE						H												L								L	L	D/L/H
75-27-4	BROMODICHLOROMETHANE																												D/L
75-25-2	BROMOFORM																												D/L
74-83-9	BROMOMETHANE																												D/L
101-55-3	BROMOPHENYL PHENYL ETHER, 4-																												D/L
71-36-3	BUTYL ALCOHOL, N-	L	L/H	L/H	L	L/H																							D/L/H
85-68-7	BUTYL BENZYL PHTHALATE																												D/L/H
7440-43-9	CADMIUM	H	H	H		H	D/L/H	L/H	H	H				H															D/L/H
13765-19-0	CALCIUM CHROMATE													H															
75-15-0	CARBON DISULFIDE	L	L	L	L	D/L																							D/L
56-23-5	CARBON TETRACHLORIDE	D/L/H	L/H	L/H	L	L/H													D	D/L									D/L
57-74-9	CHLORDANE																												D/L
126-99-8	CHLORO-1,3-BUTADIENE, 2-																		D/L	D									D/L
59-50-7	CHLORO-3-METHYL-PHENOL, 4-						H																						D/L
91-58-7	CHLORO-NAPHTHALENE, 2-																												D/L
106-47-8	CHLOROANILINE, P-																												D/L
108-90-7	CHLOROBENZENE	L/H	D/L/H	L/H	L	L/H													D	D									D/L/H
510-15-6	CHLOROBENZILATE																												D/L
124-48-1	CHLORODIBROMOMETHANE																												D/L
75-00-3	CHLOROETHANE																												D/L
67-66-3	CHLOROFORM	H	H	H		H	H												D/H	D/L									D/L/H
74-87-3	CHLOROMETHANE	H	H	H															D/H	D									D/L/H
95-57-8	CHLOROPHENOL, 2-																												D/L
107-05-1	CHLOROPROPENE, 3-																		D/L	D									D/L
7440-47-3	CHROMIUM	H	H	H		H	D/H	L/H	L/H	L/H		L	L	D/L/H					L					D	D	D	D/L	D/L	D/L/H
7440-50-8	COPPER	H	H	H		H	H	H	H	H				H															H
544-92-3	COPPER CYANIDE						H	H	H	H																			
108-39-4	CRESOL, M-	L	L	L	L	L																							D/L
95-48-7	CRESOL, O-	L	L	L	L	L																							D/L
106-44-5	CRESOL, P-	L	L	L	L	L																							D/L
1319-77-3	CRESOLS	L/H	L/H	L/H	D/L	L/H																							D/L
57-12-5	CYANIDES						D/H	D/L/H	D/L/H	D/L/H	D/L	D/L	D/L	D/L/H														L	D/L/H
108-94-1	CYCLOHEXANONE	L	L/H	L/H	L	L/H																							D/L
131-	CLOHEXYL-4,6-DINITR			H																									
	O,P'-																												D/L
	P'-																												

D = CFR definition of the waste code
L = Land Disposal Restrictions
H = Hazardous Waste Identification Rule database

TABLE 4: Crosswalk for F Codes, Non-wastewaters

CAS #	Constituent Name	F001	F002	F003	F004	F005	F006	F007	F008	F009	F010	F011	F012	F019	F020	F021	F022	F023	F024	F025	F026	F027	F028	F032	F034	F035	F037	F038	F039
93-32-9				H		H																							
83-32-9	ACENAPHTHENE																										L		D
208-96-8	ACENAPHTHYLENE																												D/L
67-64-1	ACETONE	L/H	L/H	L/H	L	L/H																							D/L
75-05-8	ACETONITRILE	H	H	H		H																							D
98-86-2	ACETOPHENONE																												D/L
75-36-5	ACETYL CHLORIDE					H	H																						
107-02-8	ACROLEIN																												D
107-13-1	ACRYLONITRILE		H	H		H																							D/L
309-00-2	ALDRIN																												D/L
107-18-6	ALLYL ALCOHOL		H			H																							
20859-73-8	ALUMINUM PHOSPHATE																												H
92-67-1	AMINOBIPHENYL, 4-																												D
62-53-3	ANILINE		H			H																							D/L
120-12-7	ANTHRACENE																												D/L
7440-36-0	ANTIMONY	H	H	H	H	H	H	H		H		H																	D/L/H
25376-45-8	AR-METHYL-BENZENEDIAMINE		H																										
140-57-8	ARAMITE																												D
7440-38-2	ARSENIC	H	H	H	H	H	H	H	H	H		H												D	D	D			D/L/H
7778-39-4	ARSENIC ACID						H																						
7440-39-3	BARIUM	H	H	H	H	H	H	H	H	H		H																	D/L/H
542-62-1	BARIUM CYANIDE											H																	
56-55-3	BENZ(A)ANTHRACENE																							D	D		L		D/L
71-43-2	BENZENE	L/H	L/H	L/H	L	D/L/H													D	D							D/L	D/L	D/L
218-01-9	BENZO(A)PHENANTHRENE					H																					D/L	D/L	D/L
205-99-2	BENZO(B)FLUORANTHENE																												D/L
207-08-9	BENZO(K)FLUORANTHENE																								D				D/L
50-32-8	BENZO(A)PYRENE																							D	D		D/L	D/L	D/L
191-24-2	BENZO(G,H,I)PERYLENE																												D/L
98-07-7	BENZOIC TRICHLORIDE			H		H																							
100-44-7	BENZYL CHLORIDE		H																										
7440-41-7	BERYLLIUM	H	H	H	H	H	H	H		H																			D/H
319-84-6	BHC, ALPHA-																												D/L
319-85-7	BHC, BETA-																												D/L
319-86-8	BHC, DELTA-																												D/L
58-89-9	BHC, GAMMA-						H																						D/L
111-44-4	BIS(2-CHLOROETHYL)ETHER																												D/L
39638-32-9	BIS(2-CHLOROISOPROPYL) ETHER																												D/L
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE					H													L								L	L	D/L
75-27-4	BROMODICHLOROMETHANE																												D/L
75-25-2	BROMOFORM																												D/L
74-83-9	BROMOMETHANE																												D/L
101-55-3	BROMOPHENYL PHENYL ETHER, 4-																												D/L
81-81-2	BRUMOLIN			H		H																							
1338-23-4	BUTANONE PEROXIDE, 2-			H		H																							
71-36-3	BUTYL ALCOHOL, N-	L/H	L/H	L/H	L	L/H																							D/L
85-68-7	BUTYL BENZYL PHTHALATE					H																							D/L
7440-43-9	CADMIUM	H	H	H	H	H	D/L/H	L/H	L/H	L/H		L	L																D/L/H
75-15-0	CARBON DISULFIDE	H	H	L/H		D/H																							D
56-23-5	CARBON TETRACHLORIDE	D/L/H	L/H	L/H	L	L/H													D/H	D/L									D/L
57-74-9	CHLORDANE						H																						D/L
126-99-8	CHLORO-1,3-BUTADIENE, 2-					H													D/L	D									D
59-50-7	CHLORO-3-METHYL-PHENOL, 4-																												D/L
91-58-7	CHLORO-NAPHTHALENE, 2-																												D/L
106-47-8	CHLOROANILINE, P-																												D/L
108-90-7	CHLOROBENZENE	L/H	D/L/H	L/H	L	L/H													D	D									D/L/H
510-15-6	CHLOROBENZILATE																												D
124-48-1	CHLORODIBROMOMETHANE																												D/L
75-00-3	CHLOROETHANE																												D/L
110-75-8	CHLOROETHOXY-ETHENE, 2-	H																											
67-66-3	CHLOROFORM	H	H	H		H																							D/L
74-[illegible]	[illegible]OROMETHANE	H	H	H		[illegible]																							D/L
[illegible]	[illegible]ROPHENOL, 2-				H																								
[illegible]	[illegible]OPROPENE																												
[illegible]	[illegible]M											L/H	L																

D = CFR definition of the waste code
L = Land Disposal Restrictions
H = Hazardous Waste Identification Rule database

TABLE 5: Crosswalk for K Codes, Wastewaters

CAS #	Constituent Name	K001	K002	K003	K004	K005	K006	K007	K008	K009	K010	K011	K013	K014	K015	K016	K017	K018	K019	K020	K021	K022	K023	K024	K025	K026	K027	K028	K029	K030	K031	K032	K033	K034	K035	K036
83-32-9	ACENAPHTHENE	D																																D		
208-96-8	ACENAPHTHYLENE	H																				H														
67-64-1	ACETONE											H	H																							
75-05-8	ACETONITRILE											D/L/H	D/L/H	D/L																						
98-86-2	ACETOPHENONE																					L/H														
79-06-1	ACRYLAMIDE											L/H	L/H	D/L																						
107-13-1	ACRYLONITRILE											D/L/H	D/L/H	L/H																						
62-53-3	ANILINE																					H														
120-12-7	ANTHRACENE	H														L						H														
7440-36-0	ANTIMONY											H	H								D/L															
25376-45-8	AR-METHYL-BENZENEDIAMINE																																			
140-57-8	ARAMITE																																			
7440-38-2	ARSENIC	H																													D/L					
1303-28-2	ARSENIC OXIDE	H																																		
7440-39-3	BARIUM																																			
17804-35-2	BENOMYL																																			
56-55-3	BENZ(A)ANTHRACENE	D/H																																D/L		
98-87-3	BENZAL CHLORIDE															D/L																				
71-43-2	BENZENE									H	H	L	L	L								H														
218-01-9	BENZO(A)PHENANTHRENE	D																																D/L		
205-99-2	BENZO(B)FLUORANTHENE	D/H														L																		D		
207-08-9	BENZO(K)FLUORANTHENE															L																				
50-32-8	BENZO(A)PYRENE	D																																D/L		
191-24-2	BENZO(G,H,I)PERYLENE																																			
98-07-7	BENZOIC TRICHLORIDE															D																				
100-44-7	BENZYL CHLORIDE																																			
7440-41-7	BERYLLIUM																																			
111-44-4	BIS(2-CHLOROETHYL)ETHER																D/L		L																		
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE																																			
542-88-1	BIS(CHLOROMETHYL) ETHER																D																			
74-83-9	BROMOMETHANE																																			
71-36-3	BUTYL ALCOHOL, N-																																			
85-68-7	BUTYL BENZYL PHTHALATE																																			
2008-41-5	BUTYLATE																																			
7440-43-9	CADMIUM																																			
1929-77-7	CARBAMOTHIOIC ACID, DIPROPYL-, S-PROPYL ES																																			
63-25-2	CARBARYL																																			
10605-21-7	CARBENDAZIM																																			
1563-66-2	CARBOFURAN																																			
75-15-0	CARBON DISULFIDE																																			
56-23-5	CARBON TETRACHLORIDE																D			D	D	D/L														
55285-14-8	CARBOSULFAN																																			
57-74-9	CHLORDANE																																L			
107-20-0	CHLORO-ACETALDEHYDE										D																										
615-74-7	CHLORO-M-CRESOL, 6-	D																																		
108-90-7	CHLOROBENZENE															D				L																
75-00-3	CHLOROETHANE																		L																	
67-66-3	CHLOROFORM									D/L/H	D/L/H									D/L	D	D/L								D/L						
74-87-3	CHLOROMETHANE									D	D								L																	
95-57-8	CHLOROPHENOL, 2-	D																																		
7440-47-3	CHROMIUM		D/L	D/L	D/L	D/L	D/L	D/L	D/L							L						L										L				
8007-45-2	COAL TAR																					D														
7440-50-8	COPPER																																			
8001-58-9	CREOSOTE	D/H																																D		
108-39-4	CRESOL, M-																																	L		
95-48-7	CRESOL, O-																																	L		
106-44-5	CRESOL, P-																																	L		
1319-77-3	CRESOLS (MIXED ISOMERS)																																			
57-12-5	CYANIDES					L		D/L				L	L	L																						
108-94-1	CYCLOHEXANONE																																			
84-74-2	DI-N-BUTYL PHTHALATE																																			
117-84-0	DI-N-OCTYL PHTHALATE																																			
53-70-	DIBENZ(A,H)ANTHRACENE	D																																D		

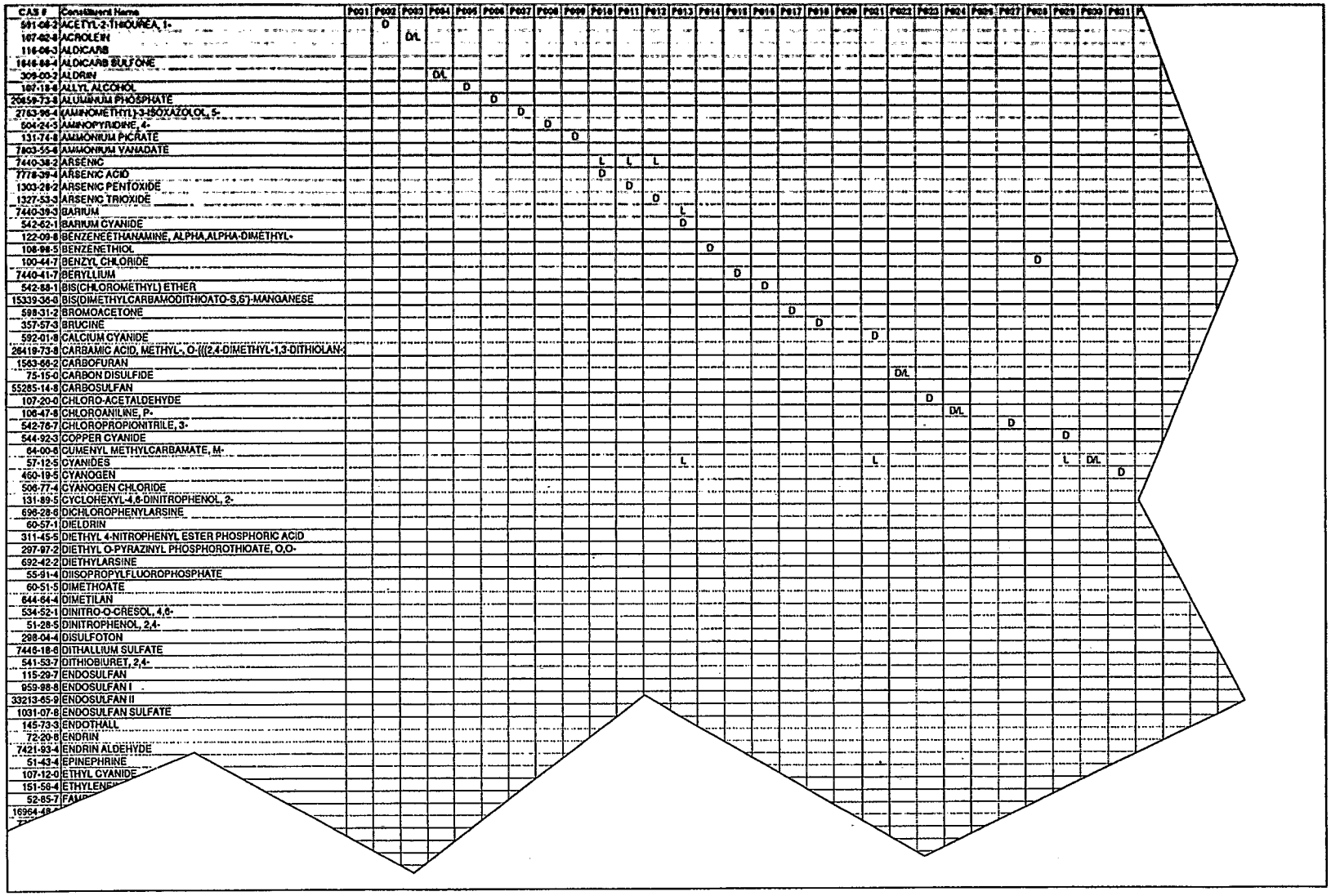
D = CFR definition of the waste code
L = Land Disposal Restrictions
H = Hazardous Waste Identification Rule database

TABLE 6: Crosswalk for K Codes, Non-wastewaters

CAS #	Constituent Name	K001	K002	K003	K004	K005	K006	K007	K008	K009	K010	K011	K013	K014	K015	K016	K017	K018	K019	K020	K021	K022	K023	K024	K025	K026	K027	K028	K029	K030	K031	K032	K033	K034	K035	K036	K037
83-32-9	ACENAPHTHENE	D																																D/L			
208-96-8	ACENAPHTHYLENE	H																																			
67-64-1	ACETONE																																				
75-05-8	ACETONITRILE											D/L	D/L	D/L																							
98-86-2	ACETOPHENONE																					L/H															
79-06-1	ACRYLAMIDE											L	L	D/L																							
107-13-1	ACRYLONITRILE											D/L	D/L	L																							
62-53-3	ANILINE																					H					H										
120-12-7	ANTHRACENE	H													L																				L		
7440-36-0	ANTIMONY																				D/L																
25376-45-8	AR-METHYL-BENZENEDIAMINE																										H										
7440-38-2	ARSENIC																														D/L						
492-80-8	AURAMINE OAF																																				
7440-39-3	BARIUM																																				
17804-35-2	BENOMYL																																				
56-55-3	BENZ(A)ANTHRACENE	D/H																																D/L			
98-87-3	BENZAL CHLORIDE														D/L																						
71-43-2	BENZENE											L	L	L																							
218-01-9	BENZO(A)PHENANTHRENE	D/H																																D/L			
205-99-2	BENZO(B)FLUORANTHENE	D/H													L																				D		
207-08-9	BENZO(K)FLUORANTHENE														L																						
50-32-8	BENZO(A)PYRENE	D/H																																D/L			
191-24-2	BENZO(G,H,I)PERYLENE																																				
98-07-7	BENZOIC TRICHLORIDE														D																						
100-44-7	BENZYL CHLORIDE																																				
7440-41-7	BERYLLIUM																																				
111-44-4	BIS(2-CHLOROETHYL)ETHER																D/L		L																		
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE																																				
542-88-1	BIS(CHLOROMETHYL) ETHER																D																				
74-83-9	BROMOMETHANE																																				
85-68-7	BUTYL BENZYL PHTHALATE																																				
2008-41-5	BUTYLATE																																				
7440-43-9	CADMIUM																																				
1929-77-7	CARBAMOTHIOIC ACID, DIPROPYL-, S-PROPYL																																				
63-25-2	CARBARYL																																				
10605-21-7	CARBENDAZIM																																				
1563-66-2	CARBOFURAN																																				
75-15-0	CARBON DISULFIDE																																				
56-23-5	CARBON TETRACHLORIDE															D			D	D	D/L																
55285-14-8	CARBOSULFAN																																				
57-74-9	CHLORDANE																															L					
59-50-7	CHLORO-3-METHYL-PHENOL, 4-	H																																			
107-20-0	CHLORO-ACETALDEHYDE										D																										
615-74-7	CHLORO-M-CRESOL, 6-	D																																			
108-90-7	CHLOROBENZENE														D				L								H										
75-00-3	CHLOROETHANE																	L																			
67-66-3	CHLOROFORM									D/L	D/L								D/L	D	D/L								D/L								
74-87-3	CHLOROMETHANE									D	D																										
95-57-8	CHLOROPHENOL, 2-	D/H																																			
7440-47-3	CHROMIUM		D/L	D/L	D/L	D/L	D/L	D/L	D/L						L							L									L						
8007-45-2	COAL TAR																					D															
7440-50-8	COPPER																																				
8001-58-9	CREOSOTE	D/H																																D			
108-39-4	CRESOL, M-																																	L			
95-48-7	CRESOL, O-																																	L			
106-44-5	CRESOL, P-																																	L			
57-12-5	CYANIDES					L		D/L				L	L	L																							
84-74-2	DI-N-BUTYL PHTHALATE																																				
117-84-0	DI-N-OCTYL PHTHALATE																																				
53-70-3	DIBENZ[A,H]ANTHRACENE	D																																D/L			
106-93-4	DIBROMOETHANE, 1,2-																																				
87-65-0	DICHLORO-PHENOL, 2,6-																																				
25321-22-6	DI[illegible]ENZENE (MIXED ISOMERS)																																				
95-[illegible]	[illegible] 1,2-																																				

D = CFR definition of the waste code
L = Land Disposal Restrictions
H = Hazardous Waste Identification Rule database

TABLE 7: Crosswalk for P Codes, Wastewaters



CAS #	Constituent Name	P001	P002	P003	P004	P005	P006	P007	P008	P009	P010	P011	P012	P013	P014	P015	P016	P017	P018	P020	P021	P022	P023	P024	P026	P027	P028	P029	P030	P031	P
591-08-2	ACETYL-2-THIOUREA, 1-		D																												
107-02-8	ACROLEIN			D/L																											
116-06-3	ALDICARB																														
1646-88-4	ALDICARB SULFONE																														
309-00-2	ALDRIN			D/L																											
107-18-6	ALLYL ALCOHOL				D																										
20859-73-8	ALUMINUM PHOSPHATE					D																									
2763-96-4	AMINOMETHYL)-3-ISOXAZOLOL, 5-						D																								
504-24-5	AMINOPYRIDINE, 4-							D																							
131-74-8	AMMONIUM PICRATE								D																						
7803-55-6	AMMONIUM VANADATE																														
7440-38-2	ARSENIC										L	L	L																		
7778-39-4	ARSENIC ACID										D																				
1303-28-2	ARSENIC PENTOXIDE											D																				
1327-53-3	ARSENIC TRIOXIDE												D																		
7440-39-3	BARIUM													L																	
542-62-1	BARIUM CYANIDE													D																	
122-09-8	BENZENEETHANAMINE, ALPHA,ALPHA-DIMETHYL-																														
108-98-5	BENZENETHIOL														D																
100-44-7	BENZYL CHLORIDE																										D				
7440-41-7	BERYLLIUM															D															
542-88-1	BIS(CHLOROMETHYL) ETHER																D														
15339-36-3	BIS(DIMETHYLCARBAMODITHIOATO-S,S')-MANGANESE																	D													
598-31-2	BROMOACETONE																		D												
357-57-3	BRUCINE																				D										
592-01-8	CALCIUM CYANIDE																					D/L									
26419-73-8	CARBAMIC ACID, METHYL-, O-[(2,4-DIMETHYL-1,3-DITHIOLAN-																						D								
1563-66-2	CARBOFURAN																														
75-15-0	CARBON DISULFIDE																														
55285-14-8	CARBOSULFAN																														
107-20-0	CHLORO-ACETALDEHYDE																														
106-47-8	CHLOROANILINE, P-																														
542-76-7	CHLOROPROPIONITRILE, 3-																														
544-92-3	COPPER CYANIDE																														
64-00-6	CUMENYL METHYLCARBAMATE, M-																														
57-12-5	CYANIDES													L								L									
460-19-5	CYANOGEN																														
506-77-4	CYANOGEN CHLORIDE																														
131-89-5	CYCLOHEXYL-4,6-DINITROPHENOL, 2-																														
696-28-6	DICHLOROPHENYLARSINE																														
60-57-1	DIELDRIN																														
311-45-5	DIETHYL 4-NITROPHENYL ESTER PHOSPHORIC ACID																														
297-97-2	DIETHYL O-PYRAZINYL PHOSPHOROTHIOATE, O,O-																														
692-42-2	DIETHYLARSINE																														
55-91-4	DIISOPROPYLFLUOROPHOSPHATE																														
60-51-5	DIMETHOATE																														
644-64-4	DIMETILAN																														
534-52-1	DINITRO-O-CRESOL, 4,6-																														
51-28-5	DINITROPHENOL, 2,4-																														
298-04-4	DISULFOTON																														
7446-18-6	DITHALLIUM SULFATE																														
541-53-7	DITHIOBIURET, 2,4-																														
115-29-7	ENDOSULFAN																														
959-98-8	ENDOSULFAN I																														
33213-65-9	ENDOSULFAN II																														
1031-07-8	ENDOSULFAN SULFATE																														
145-73-3	ENDOTHALL																														
72-20-8	ENDRIN																														
7421-93-4	ENDRIN ALDEHYDE																														
51-43-4	EPINEPHRINE																														
107-12-0	ETHYL CYANIDE																														
151-56-4	ETHYLENE																														
52-85-7	FAM																														
16964-48-																															

D = CFR definition of the waste code
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TABLE 8: Crosswalk for P Codes, Non-wastewaters

CAS #	Constituent Name	P001	P002	P003	P004	P005	P006	P007	P008	P009	P010	P011	P012	P013	P014	P015	P016	P017	P018	P020	P021	P022	P023	P024	P026	P027	P028	P029	P030	P031	A
591-08-2	ACETYL-2-THIOUREA, 1-		D																												
107-02-8	ACROLEIN			D																											
116-06-3	ALDICARB																														
1646-88-4	ALDICARB SULFONE																														
309-00-2	ALDRIN				D/L																										
107-18-6	ALLYL ALCOHOL					D																									
20859-73-8	ALUMINUM PHOSPHATE						D																								
2763-96-4	(AMINOMETHYL)-3-ISOXAZOLOL, 5-							D																							
504-24-5	AMINOPYRIDINE, 4-								D																						
131-74-8	AMMONIUM PICRATE									D																					
7803-55-6	AMMONIUM VANADATE																														
7440-38-2	ARSENIC										L	L	L																		
7778-39-4	ARSENIC ACID										D																				
1303-28-2	ARSENIC PENTOXIDE											D																			
1327-53-3	ARSENIC TRIOXIDE												D																		
7440-39-3	BARIUM													L																	
542-62-1	BARIUM CYANIDE													D																	
122-09-8	BENZENEETHANAMINE, ALPHA,ALPHA-DIMETHYL-																														
108-98-5	BENZENETHIOL														D																
100-44-7	BENZYL CHLORIDE																										D				
7440-41-7	BERYLLIUM															D															
542-88-1	BIS(CHLOROMETHYL) ETHER																D														
15339-36-3	BIS(DIMETHYLCARBAMODITHIOATO-S,S')-MANGANESE																														
598-31-2	BROMOACETONE																	D													
357-57-3	BRUCINE																		D												
592-01-8	CALCIUM CYANIDE																				D										
26419-73-8	CARBAMIC ACID, METHYL-, O-(((2,4-DIMETHYL-1,3-DITHIOLAN-2																														
1563-66-2	CARBOFURAN																														
75-15-0	CARBON DISULFIDE																					D/L									
55285-14-8	CARBOSULFAN																														
107-20-0	CHLORO-ACETALDEHYDE																						D								
106-47-8	CHLOROANILINE, P-																							D/L							
542-76-7	CHLOROPROPIONITRILE, 3-																									D					
544-92-3	COPPER CYANIDE																											D			
64-00-6	CUMENYL METHYLCARBAMATE, M-																														
57-12-5	CYANIDES													L							L							L	D/L		
460-19-5	CYANOGEN																													D	
506-77-4	CYANOGEN CHLORIDE																														
131-89-5	CYCLOHEXYL-4,6-DINITROPHENOL, 2-																														
696-28-6	DICHLOROPHENYLARSINE																														
60-57-1	DIELDRIN																														
311-45-5	DIETHYL 4-NITROPHENYL ESTER PHOSPHORIC ACID																														
297-97-2	DIETHYL O-PYRAZINYL PHOSPHOROTHIOATE, O,O-																														
692-42-2	DIETHYLARSINE																														
55-91-4	DIISOPROPYLFLUOROPHOSPHATE																														
60-51-5	DIMETHOATE																														
644-64-4	DIMETILAN																														
534-52-1	DINITRO-O-CRESOL, 4,6-																														
51-28-5	DINITROPHENOL, 2,4-																														
298-04-4	DISULFOTON																														
7446-18-6	DITHALLIUM SULFATE																														
541-53-7	DITHIOBIURET, 2,4-																														
115-29-7	ENDOSULFAN																														
959-98-8	ENDOSULFAN I																														
33213-65-9	ENDOSULFAN II																														
1031-07-8	ENDOSULFAN SULFATE																														
145-73-3	ENDOTHALL																														
72-20-8	ENDRIN																														
7421-93-4	ENDRIN ALDEHYDE																														
51-43-4	EPINEPHRINE																														
107-12-0	ETHYL CYANIDE																														
151-56-4	ETHYLENE																														
52-85-7	FAM																														
7782-41																															

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TABLE 9: Crosswalk for U Codes, Wastewaters

CAS #	Constituent Name	U001	U002	U003	U004	U005	U006	U007	U008	U009	U010	U011	U012	U014	U015	U016	U017	U018	U019	U020	U021	U022	U023	U024	U025	U026	U027	U028	U029	U030	U031	U032	U033
75-07-0	ACETALDEHYDE	D																															
67-64-1	ACETONE		D/L																														
75-05-8	ACETONITRILE			D/L																													
98-86-2	ACETOPHENONE				D/L																												
75-36-5	ACETYL CHLORIDE						D																										
79-06-1	ACRYLAMIDE							D																									
79-10-7	ACRYLIC ACID								D																								
107-13-1	ACRYLONITRILE									D/L																							
61-82-5	AMITROLE											D																					
62-53-3	ANILINE												D/L																				
7440-38-2	ARSENIC																																
492-80-8	AURAMINE OAF													D																			
115-02-6	AZASERINE														D																		
101-27-9	BARBAN																																
22781-23-3	BENDIOCARB																																
22961-82-6	BENDIOCARB PHENOL																																
17804-35-2	BENOMYL																																
56-55-3	BENZ(A)ANTHRACENE																D/L																
225-51-4	BENZ(C)ACRIDINE															D																	
98-87-3	BENZAL CHLORIDE																D																
71-43-2	BENZENE																		D/L														
305-03-3	BENZENEBUTANOIC ACID																																
98-09-9	BENZENESULFONYL CHLORIDE																			D													
92-87-5	BENZIDINE																				D												
218-01-9	BENZO(A)PHENANTHRENE																																
189-55-9	BENZO(RST)PENTAPHENE																																
50-32-8	BENZO(A)PYRENE																					D/L											
106-51-4	BENZOQUINONE, P-																																
98-07-7	BENZOTRICHLORIDE																						D										
319-84-6	BHC, ALPHA-																																
319-85-7	BHC, BETA-																																
319-86-8	BHC, DELTA-																																
58-89-9	BHC, GAMMA- (LINDANE)																																
111-44-4	BIS(2-CHLOROETHYL)ETHER																							D/L									
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE																										D/L						
1333-32-6	BIS(ACETATO-O)TETRAHYDROXYTRI-LEAD																																
137-29-1	BIS(DIMETHYLCARBAMODITHIOATO-S,S')-COPPER																																
97-74-5	BIS(DIMETHYLTHIOCARBAMOYL) SULFIDE																																
75-25-2	BROMOFORM																																
74-83-9	BROMOMETHANE																											D/L					
101-55-3	BROMOPHENYL PHENYL ETHER, 4-																												D/L				
71-36-3	BUTYL ALCOHOL, N-																													D/L			
2008-41-5	BUTYLATE																																
13765-19-0	CALCIUM CHROMATE																															D	
136-30-1	CARBAMODITHIOIC ACID, DIBUTYL-, SODIUM SALT																																
148-18-5	CARBAMODITHIOIC ACID, DIETHYL-, SODIUM SALT																																
52888-80-9	CARBAMOTHIOIC ACID, DIPROPYL-, S-(PHENYLMETHYL) ESTER																																
1929-77-7	CARBAMOTHIOIC ACID, DIPROPYL-, S-PROPYL ESTER																																
63-25-2	CARBARYL																																
10605-21-7	CARBENDAZIM																																
1563-38-8	CARBOFURAN PHENOL																																
56-23-5	CARBON TETRACHLORIDE																																
353-50-4	CARBONIC DIFLUORIDE																																D
57-74-9	CHLORDANE																																
494-03-1	CHLORNAPHAZINE																									D							
59-50-7	CHLORO-3-METHYL-PHENOL, 4-																																
91-58-7	CHLORO-NAPHTHALENE, 2-																																
3165-93-3	CHLORO-O-TOLUIDINE, HYDROCHLORIDE, 4-																																
108-90-7	CHLOROBENZENE																																
510-15-6	CHLOROB[illegible]LATE																																
110-75-8	CHLO[illegible]ETHENE, 2-																																
67-66-3	CH[illegible]																																
74-87-3																																	
107-[illegible]	[illegible]HER																																

D = CFR definition of the waste code
L = Land Disposal Restrictions

TABLE 10: Crosswalk for U Codes, Non-wastewaters

CAS #	Constituent Name	U001	U002	U003	U004	U005	U006	U007	U008	U009	U010	U011	U012	U014	U015	U016	U017	U018	U019	U020	U021	U022	U023	U024	U025	U026	U027	U028	U029	U030	U031	U032	U033	U
75-07-0	ACETALDEHYDE	D																																
67-64-1	ACETONE		D/L																															
75-05-8	ACETONITRILE			D/L																														
98-86-2	ACETOPHENONE				D/L																													
75-36-5	ACETYL CHLORIDE						D																											
79-06-1	ACRYLAMIDE							D																										
79-10-7	ACRYLIC ACID								D																									
107-13-1	ACRYLONITRILE									D/L																								
61-82-5	AMITROLE											D																						
62-53-3	ANILINE												D/L																					
7440-38-2	ARSENIC																																	
492-80-8	AURAMINE OAF													D																				
115-02-6	AZASERINE														D																			
101-27-9	BARBAN																																	
22781-23-3	BENDIOCARB																																	
22961-82-6	BENDIOCARB PHENOL																																	
17804-35-2	BENOMYL																																	
56-55-3	BENZ(A)ANTHRACENE																	D/L																
225-51-4	BENZ[C]ACRIDINE															D																		
98-87-3	BENZAL CHLORIDE																D																	
71-43-2	BENZENE																		D/L															
305-03-3	BENZENEBUTANOIC ACID																																	
98-09-9	BENZENESULFONYL CHLORIDE																			D														
92-87-5	BENZIDINE																				D													
218-01-9	BENZO(A)PHENANTHRENE																																	
189-55-9	BENZO(RST)PENTAPHENE																																	
50-32-8	BENZO[A]PYRENE																					D/L												
106-51-4	BENZOQUINONE, P-																						D											
98-07-7	BENZOTRICHLORIDE																																	
319-84-6	BHC, ALPHA-																																	
319-85-7	BHC, BETA-																																	
319-86-8	BHC, DELTA-																																	
58-89-9	BHC, GAMMA- (LINDANE)																																	
111-44-4	BIS(2-CHLOROETHYL)ETHER																								D/L									
39638-32-9	BIS(2-CHLOROISOPROPYL) ETHER																										L							
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE																											D/L						
1335-32-6	BIS(ACETATO-O)TETRAHYDROXYTRI-LEAD																																	
137-29-1	BIS(DIMETHYLCARBAMODITHIOATO-S,S')-COPPER																																	
97-74-5	BIS(DIMETHYLTHIOCARBAMOYL) SULFIDE																																	
75-25-2	BROMOFORM																																	
74-83-9	BROMOMETHANE																												D/L					
101-55-3	BROMOPHENYL PHENYL ETHER, 4-																													D/L				
71-36-3	BUTYL ALCOHOL, N-																														D/L			
2008-41-5	BUTYLATE																																	
13765-19-0	CALCIUM CHROMATE																															D		
136-30-1	CARBAMODITHIOIC ACID, DIBUTYL-, SODIUM SALT																																	
148-18-5	CARBAMODITHIOIC ACID, DIETHYL-, SODIUM SALT																																	
52888-80-9	CARBAMOTHIOIC ACID, DIPROPYL-, S-(PHENYLMETHYL) ESTER																																	
1929-77-7	CARBAMOTHIOIC ACID, DIPROPYL-, S-PROPYL ESTER																																	
63-25-2	CARBARYL																																	
10605-21-7	CARBENDAZIM																																	
1563-38-8	CARBOFURAN PHENOL																																	
56-23-5	CARBON TETRACHLORIDE																																	
353-50-4	CARBONIC DIFLUORIDE																																D	
57-74-9	CHLORDANE																																	
494-03-1	CHLORNAPHAZINE																									D								
59-50-7	CHLORO-3-METHYL-PHENOL, 4-																																	
91-58-7	CHLORO-NAPHTHALENE, 2-																																	
3165-93-3	CHLORO-O-TOLUIDINE, HYDROCHLORIDE, 4-																																	
108-90-7	CHLORO[illegible]ENE																																	
510-15-6	CHLO[illegible]TE																																	
110-75-8	C[illegible]IENE, 2-																																	
67-66	[illegible]																																	
7[illegible]	[illegible]																																	

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APPENDIX G
DATA DICTIONARY

Table Name: BRSDESC

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
DESCRIPT	Text	68		RCRA Code Description	---
SCODE	Text	4		RCRA Code	---

Table Name: CHEMICAL

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
CASNUMBER	Long Integer	4	0000000-00-0	CAS Registry Number	Valid Numeric
NAME	Text	90		Chemical Name	Required
USING	Boolean	1	Yes/No	Flag Indicating Whether the Name is Used as the WMPT Primary Name for a Chemical	True or False

Table Name: CHEMINFO

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
ACGIHTLV	Text	1		ACGIH Threshold Limit Values	---
ACUTE_ENDPT	Text	4		Measured Acute Endpoint: GMATC, LC50, or EC50	---
AerobicSumCode	Text	2		Aerobic Summary Code	---
PRESCRD_MEAS_ ACUTE	Text	3		Prescored Measured Acute Value	---
PRESCRD_MEAS_ CHRON	Text	3		Prescored Measured Chronic Value	---

Table Name: CHEMINFO (Cont.)

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
ATSDR	Text	1		Agency for Toxic Substances and Disease Registry List (under SARA Section 104(6)(a))	---
AWQC_ACUTE	Single Numeric	4		Acute Aquatic Water Quality Criteria, ppm	Valid Numeric
AWQC_CHRON	Single Numeric	4		Chronic Aquatic Water Quality Criteria (AWQC), ppm	Valid Numeric
BAF	Single Numeric	4		Bioaccumulation Factor	Valid Numeric
BCF	Single Numeric	4		Bioconcentration Factor	Valid Numeric
BCF_Reference	Text	50		References: EPI=Estimation Program Interface (predicted); HWIP; or ISIS Base	---
BIOACCUM	Byte	1		Bioaccumulation Score	Valid Numeric
CAAA112	Text	1		Clean Air Act Amendments Section 602 and Clean Air Act Section 112 (r) Chemicals	---
CAAATIT3	Text	1		Clean Air Act Amendments Title III Hazardous Air Pollutants	---
CASNUMBER	Long Integer	4	0000000-00-0	CAS Registry Number	Valid Numeric
CHANGED	Boolean	1	Yes/No	Chemical Data Changed Flag	True or False
CHEMICAL	Text Integer	90		Chemical Name	---
CHRON_ENDPT	Text	4		Measured Chronic Endpoint: GMATC, LC50, or EC50	---
CLOAEL	Single Numeric	4		Chronic Lowest Observed Adverse Effect Level (LOAEL), mg/kg/day	Valid Numeric
CNOAEL	Single Numeric	4		Chronic No Observed Adverse Effect Level (NOAEL), mg/kg/day	Valid Numeric
CORRLIST	Text	1		Chemicals on Reporting Rules Database (CORR)	---
CWA311	Text	1		Clean Water Act Section 311(b)(2)(A) Hazardous Substances	---
CWAPP	Text	1		Clean Water Act Priority Pollutants	---

Table Name: CHEMINFO (Cont.)

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
ECOHAZ	Byte	1		Ecological Hazard Score	Valid Numeric
GLWQI_I_FAV	Double Numeric	8		Great Lakes Water Quality Initiative Final Acute Value Tier I (GLWQI FAV), ppm	Valid Numeric
GLWQI_I_FCV	Double Numeric	8		Great Lakes Water Quality Initiative Final Chronic Value Tier I (GLWQI FCV), ppm	Valid Numeric
GLWQI_II_SCV	Double Numeric	8		Great Lakes Water Quality Initiative Secondary Chronic Value Tier II (GLWQI SCV), ppm	Valid Numeric
HSATRANK	Byte	1		Chemical Category Human Health Ranking	Valid Numeric
HUMHAZC	Byte	1		Human Hazard Carcinogen Score	Valid Numeric
HUMHAZNC	Byte	1		Human Hazard Noncarcinogen Score	Valid Numeric
RCRAPCODES	Text	1		Hazardous Waste Constituents List - RCRA P List	---
RCRAUCODES	Text	1		Hazardous Waste Constituents List - RCRA U List	---
HydrolysisHalflifeAtPH7	Single Numeric	4		Hydrolysis Half-life at pH7 (days)	Valid Numeric
LOGP	Single Numeric	4	Scientific	Logarithm of the Octanol-Water Partition Coefficient	Valid Numeric
MEAS_ACUTE	Double Numeric	8		Measured Acute Toxicity Concentration, ppm	Valid Numeric
MEAS_CHRON	Double Numeric	8		Measured Chronic Toxicity Concentration, ppm	Valid Numeric
Metals	Text	3		Metal Category: M=Elemental Metal, MSA=Metal Salt of Alkali or Alkaline Earth Metals, MSB=Any Other Metal Salt, MC=Metal Compound, RN=Radionuclide, MIN=Metal Containing Mineral	---
MTL	Text	1		Master Testing List Developed by EPA's OPPT	---
NIOSHREL	Text	1		NIOSH Recommended Exposure Limit List	---

Table Name: CHEMINFO (Cont.)

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
NONLINBIO	Single Numeric	4		Estimate of Biodegradation Using the Non-linear Biodegradation Model	Valid Numeric
NTS	Integer	2		No Toxic Effects Expected in a Saturated Solution (EPA/ECOSAR)	Valid Numeric
OSHAPEL	Text	1		OSHA Permissible Exposure Limit List	---
PCLIST	Boolean	1		List Identifier - Prioritized Chemical List (PCLIST)	True or False
PERSIST	Byte	1		Persistence Score	Valid Numeric
PERSIST_FLAG1	Boolean	1	Yes/No	Persistence Flag 1 (for internal use)	True or False
PERSIST_FLAG2	Boolean	1	Yes/No	Persistence Flag 2 (for internal use)	True or False
PHSATRANK	Byte	1		Human Health Structure Activity Team (SAT) Ranking	Valid Numeric
PRED_ACUTE	Double Numeric	8		Predicted Acute Toxicity Concentration, ppm	Valid Numeric
PRED_CHRON	Double Numeric	8		Predicted Chronic Toxicity Concentration, ppm	Valid Numeric
QSAS_COC	Single Numeric	4		Quantitative Structure Activity Relationship Concentration of Concern (QSAR COC)	Valid Numeric
QSTAR	Single Numeric	4		Cancer Slope Factor (q1*), mg/kg/day	Valid Numeric
QSTAR_SOURCE	Text	50		Cancer Slope Factor (q1*) Source (IRIS or HEAST)	
RCRAIX	Text	1		RCRA Section 3001 Hazardous Wastes, Appendix IX Ground Water Monitoring List	---
RCRAVIII	Text	1		RCRA Section 3001 Hazardous Wastes, Appendix VIII Hazardous Constituents	---
Reliability	Integer	2		Reliability Code	Valid Numeric
RFC	Single Numeric	4		Reference Concentration (RfC), mg/m3	Valid Numeric
RFD	Single Numeric	4		Reference Dose (RfD), mg/kg/day	Valid Numeric
RFD_SOURCE	Text	50		Reference Dose Source (IRIS OR HEAST)	

Table Name: CHEMINFO (Cont.)

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
RQ	Double Numeric	8		Underlying Reportable Quantity (RQ) Values (WMPT), lbs	Valid Numeric
RQAQUATTOX	Single Numeric	4		Aquatic Toxicity Reportable Quantity, lbs	Valid Numeric
RQPOT	Single Numeric	4		Carcinogen Reportable Quantity (RQ) Potency Factor, mg/kg/day	Valid Numeric
SARA302	Text	1		Extremely Hazardous Substances Listed Under SARA Title III Section 302	---
SARA313	Text	1		TRI Chemicals on Superfund Amendments and Reauthorization Act Title III Section 313 (SARA313)	---
SATALTCAT	Text	30		Structure Activity Team (SAT) Alternate Category	---
SATCAT	Text	30		Structure Activity Team (SAT) Category	---
SATSUBCAT	Text	30		Structure Activity Team (SAT) Subcategory	---
SCLOAEL	Single Numeric	4		Subchronic Lowest Observed Adverse Effect Level (LOAEL), mg/kg/day	Valid Numeric
SCNOAEL	Single Numeric	4		Subchronic No Observed Adverse Effect Level (NOAEL), mg/kg/day	Valid Numeric
SDWA	Text	1		Safe Drinking Water Act Contaminants	---
SED_I_FCV	Double Numeric	8		Sediment Quality Final Chronic Value Tier I (SQ FCV), ppm	Valid Numeric
SOURCEWOE	Text	10		Cancer Weight of Evidence Source [IRIS or IARC]	---
TPQ	Single Numeric	4		Threshold Planning Quantity (TPQ), lbs	Valid Numeric
TRIREL	Integer	2		TRI Releases	Valid Numeric
TSCARANK	Byte	1		TSCA Section 8(e) Ranking	Valid Numeric
ULTSURV	Single Numeric	4		Estimate of Biodegradation Using the Ultimate Survey Model	Valid Numeric

Table Name: CHEMINFO (Cont.)

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
WEIGHTOFE	Text	1		Cancer Weight of Evidence (WOE)	A, B, C, D
WHYBIOACCUM	Long Integer	4		Factors Contributing to Bioaccumulation Score	Valid Numeric
WHYECOHAZ	Long Integer	4		Factors Contributing to Ecological Hazard Score	Valid Numeric
WHYHUMHAZC	Long Integer	4		Factors Contributing to Human Hazard Carcinogen Score	Valid Numeric
WHYHUMHAZNC	Long Integer	4		Factors Contributing to Human Hazard Noncarcinogen Score	Valid Numeric

Table Name: COMPONENTS

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
APPL	Integer	2		Application Identifier	Valid Numeric
Caption	Text	50		Scoring Component Description	---
COMP	Integer	2		Scoring Component ID Number	Valid Numeric

Table Name: FENCELINES

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
APPL	Integer	2		Application Identifier	Valid Numeric
CAPTION	Text	51		Data Element Description	---
CHANGED	Boolean	1	Yes/No	Flag Indicating Fenceline Changes by User	True or False
COMP	Integer	2		Component ID Number	Valid Numeric
DIST	Text	5		Distribution of the Data to Calculate Fencelines	---
FENCE	Long Integer	4		Scoring	Valid Numeric
FIELDNAME	Text	20		Field Name of the Data Element	---
HIGHCONST	Single Numeric	4		High Fenceline for Constant Option	Valid Numeric
HIGHDIST	Single Numeric	4		High Fenceline for Distribution Option	Valid Numeric
HIGHHIGHV	Single Numeric	4		High Fenceline for Range Option	Valid Numeric
HIGHOP	Integer	2		High Fenceline Operator ID Number: 0: < 1: ≤ 2: > 3: ≥ 4: = 5: <>	Valid Numeric
LOWCONST	Single Numeric	4		Low Fenceline for Constant Option	Valid Numeric
LOWDIST	Single Numeric	4		Low Fenceline for Distribution Option	Valid Numeric
LOWHIGHV	Single Numeric	4		Low Fenceline for Range Option	Valid Numeric
LOWOP	Integer	2		Low Fenceline Operator ID Number: 0: < 1: ≤ 2: > 3: ≥ 4: = 5: <>	Valid Numeric
METHOD	Integer	2		Fenceline Calculation Method ID Number: 0: Constant 1: Range 2: Distribution	Valid Numeric
PRESCORED	Boolean	1	Yes/No	Flag Indicating a Prescored Fenceline	True or False
QUALITY	Integer	2		Data Quality Ranking Number	Valid Numeric 1 to 15
TABLE	Text	8		Table Containing the Data Element	---

Table Name: GROUPS

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
FIELDNAME	Text	8		Chemical List Identifier	Required
DESCRIPTION	Memo	0		Description of the Chemical List	---
NAME	Text	30		Chemical List Name	Required

Table Name: MASS

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
CASNUMBER	Long Integer	4	000-00-0	CAS Registry Number	Valid Numeric
EPAID	Text	12		Facility ID	---
FACILITY	Memo	0		Facility Name	---
MASS	Long Integer	4		Mass	Valid Numeric
REGION	Byte	1		Region	Valid Numeric
SCORE	Single Numeric	4	Fixed	Score	Valid Numeric
SICCODE	Integer	2		SIC Code	Valid Numeric
STATE	Text	2		State	---
WASTESTREAM	Byte	1		Stream ID	Valid Numeric

Table Name: MASTERLIST

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
CASNUMBER	Long Integer	4	0000000-00-0	CAS Registry Number	Valid Numeric
ECOEXP	Byte	1		Ecological Exposure Score	Valid Numeric
ECOHAZ2	Byte	1		Ecological Hazard Score	Valid Numeric
ECOSUB	Byte	1		Ecological Risk Potential Score	Valid Numeric
EPAINT	Byte	1		EPA Interest Rating	Valid Numeric
HUMEXP	Byte	1		Human Exposure Score	Valid Numeric
HUMHAZ	Byte	1		Human Hazard Score	Valid Numeric
HUMSUB	Byte	1		Human Risk Potential Score	Valid Numeric
SCORE	Byte	1		Overall Chemical Score	Valid Numeric

Table Name: RCRA_NWW

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
ASSOCIATION	Text	5		Source of Data: D = CFR Definition of RCRA Code, H = HWIR Database, L = Land Disposal Restrictions.	---
CASNUMBER	Long Integer	4		CAS Registry Number	Valid Numeric
RCRA_CODE	Text	4		RCRA Code Associated with the Chemical	---

Table Name: RCRA_WW

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
ASSOCIATION	Text	5		Source of Data: D = CFR Definition of RCRA Code, H = HWIR Database, L = Land Disposal Restrictions.	---
CASNUMBER	Long Integer	4		CAS Registry Number	Valid Numeric
RCRA_CODE	Text	4		RCRA Code Associated with the Chemical	---

Table Name: STATES

Field Name	Field Type	Field Size	Field Format	Description	Validation Requirement
FIPS	Text	2		FIPS State Code (2 digit)	---
HighZIP	Text	5		Upper bound of ZIP code range	---
LowZIP	Text	5		Lower bound of ZIP code range	---
REGION	Byte	1		EPA Region (Arabic numeral)	Valid Numeric
STATE	Text	2		State Abbreviation (2 character)	---
STATENAME	Text	20		State Name	---